



Health and Social Outcomes and Health Service Experiences of UK Military Veterans

A summary of the evidence

November 2009

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EXECUTIVE SUMMARY

1. Background

- 1.1 Each year approximately 24,000 men and women leave the British Armed Forces and enter civilian life. There is increasing international recognition, both within the military and in civilian society, of the health and social needs of ex-Service personnel, in particular mental health problems, such as post-traumatic stress disorder (PTSD), and social exclusion.
- 1.2 The ongoing conflicts in Iraq and Afghanistan have heightened interest in the welfare and health of Service personnel on their return from duty and then as they return to civilian life. The psychological well-being of Service personnel is a high profile issue, with media coverage typically focusing on the minority who fare badly and become socially excluded, such as those who are homeless, commit suicide or have severe mental health problems.

2. Approach

- 2.1 In this report we summarise the available evidence on the health and social outcomes, and the health service experiences, of former members of the UK Armed Forces (hereafter referred to as ex-Service personnel). An earlier report on this topic [1], published in 2003, revealed a dearth of evidence for outcomes among UK ex-Service personnel. Nevertheless, the limited evidence available suggested that the majority of personnel do well after they leave the Armed Forces.
- 2.2 In the current report we review the national and international literature, focusing mainly, but not exclusively, on material that has been published since 2003.
- 2.3 The majority of the information on ex-Service personnel is from studies of US war veterans. Such studies should be interpreted with caution for the UK because of the differences that exist between the two countries, namely the Vietnam War experience and the existence of the US Veterans Administration that provides dedicated, bespoke medical and psychiatric treatment for ex-Service personnel. In the current report we focus, where possible, on work that examines outcomes for UK personnel.

3. The research landscape

- 3.1 Since 2003, there have been important publications relating to military personnel from the UK and the US.
- 3.2 In 2006, the King's Centre for Military Health Research (KCMHR) published the results of the first phase of a cohort study that was set up to examine the effects of deployment to Iraq on the health and long term outcomes of UK military personnel. This cohort has since been followed up: data collection ceased at the end of September 2009, and the initial results will be published early in 2010. The follow-up cohort will include a substantial number of ex-Service personnel on whom data have been collected regarding experiences post-discharge (e.g. accommodation, employment, debt and crime). These data will provide a contemporaneous picture of the health and social needs of UK ex-Service personnel.
- 3.3 The Millennium Cohort study, the largest prospective study ever undertaken in the US military, began early in the current millennium, with the first phase of enrolment completed in July 2003. This study uses a phased enrolment strategy to eventually include more than 100,000 US Service members who will be followed up every 3 years until 2022, regardless of whether they remain in the military. The first phase of enrolment resulted in 77,047 consenting participants, representative of both regular and reserve Forces.
- 3.4 Also of note for the UK are a large cohort study of the effects of deployment to the Gulf on mortality and cancer incidence, and a record linkage study of suicide in ex-Service personnel.

4. Main findings

- 4.1 The main findings from these and other studies are that:
- Taken as a whole, the ex-Service population, which has been estimated at around 3.8 million for England, has comparable health to the general population.
 - The current generation of UK military personnel (serving and ex-serving) have higher rates of heavy drinking than the general population. However, this difference may attenuate with age.
 - The most common mental health problems for ex-Service personnel are alcohol problems, depression and anxiety disorders.
 - In terms of the prevalence of mental disorders, ex-Service personnel are similar to their still-serving counterparts and broadly similar to the general population.
 - Military personnel with mental health problems are more likely to leave over a given period than those without such problems and are at increased risk for adverse outcomes in post service life.
 - The minority who leave the military with psychiatric problems are at increased risk of social exclusion and ongoing ill health.

- The overall rate of suicide is no higher in UK ex-Service personnel than it is in the UK general population; ex-Service men aged 24 or younger are, however, at an increased risk relative to their general population counterparts.
- Early Service leavers are more likely to have adverse outcomes (e.g. suicide, mental health problems) and risk taking behaviours (e.g. heavy alcohol consumption, suicidal thoughts) than longer serving veterans.
- Studies looking at delayed-onset PTSD have tended to be retrospective and based on relatively small numbers of ex-Service personnel. The results of these studies should be treated with caution until prospective data are available.
- Involvement in chemical weapons experiments at Porton Down is not associated with an overall increase in mortality or cancer morbidity.
- Deployment to the Gulf in 1990/1991:
 - is associated with increased mortality from non-disease-related causes (e.g. road traffic accidents) in the short term but this effect subsides over time and is no longer detectable 7 years post deployment;
 - is not associated with adverse effects on reproductive health or with an overall increase in the incidence of cancer.
- Deployment to Iraq or Afghanistan is associated with adverse mental health outcomes among some groups, particularly those with pre-Service vulnerabilities, those who experience a high level of combat, and reservists (compared with regulars).
- US data, collected from US military personnel post-deployment to Iraq or Afghanistan, suggest a surge in mental health problems on return to the US that continues to increase over time. There is as yet no evidence to suggest that this is happening in the UK. Definitive UK-based data will be available from the KCMHR cohort study early in 2010.

5. Recommendations for future research

5.1 While the evidence base has grown considerably since 2003, many gaps remain concerning the health and social outcomes of UK ex-Service personnel. Many of the remaining questions require studies that involve longitudinal follow-up. We therefore suggest that:

- Consideration should be given to a stratified follow up of a sample of veterans. This would be made simpler if consent was obtained at recruitment, during military service or at discharge to permit later follow up. Steps should be taken to assess the feasibility of obtaining routine consent for follow-up and health surveillance on leaving the Armed Forces.
- Studies should be planned in which data collection starts before either in-Service or post-Service adverse outcomes have occurred. This could involve either a

longitudinal cohort study commencing with data collection on entering the military or the deliberate collection of data at recruitment with the explicit purpose of record linkage to data on subsequent service and post service outcomes.

- 5.2 There is potential for using data linkage of routinely collected data, especially with the introduction of the Defence Medical Information Capability Programme (DMICP) and Connecting for Health. Potential obstacles include issues of informed consent and data protection as well as more practical issues related to the need for a systematic approach to be taken to collecting and collating data. However, there are some positive developments. First, the development of the Secondary Uses Service to include Safe Havens where researchers do not need to use personally identifiable data has considerable potential. Second, researchers at King's College London have obtained permission to record link data on the KCMHR military cohort with criminal justice system data from the Police National Computer. After consultations with the Ministry of Justice, the Home Office and the Information Commissioner, and with appropriate ethical committees, it was agreed that this was a lawful example of record linkage of identifiable person information without consent. Third, the new GMC Guidelines on Confidentiality (September 2009) signal a more proportionate approach to using health care data to promote health care research. Finally, there is the new Scottish pilot study that aims to identify ex-Service personnel using the NHS Central Registry.
- 5.3 While longitudinal cohort studies can and are being used, randomised controlled trials (RCTs) remain the gold standard where the question is "What works for whom?". For example, UK policy on screening is formulated by the National Screening Committee, and requires evidence from RCTs before any new screening programme can be adopted by the NHS. Successive Surgeon Generals have indicated that the military health care system should use the same standards. Any policy decision on the efficacy of a particular intervention can only be determined by an RCT.
- 5.4 There is a need for further qualitative work to explore questions which are currently not well enough understood to be studied using quantitative methods. Qualitative studies could, for example, be used to examine the transition from military to civilian life, or to explore the risks and benefits of alcohol use within current military culture.
- 5.5 Finally, we recommend that the evidence on health-related outcomes and experiences among ex-Service personnel is reviewed periodically.

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1 INTRODUCTION

In this report we summarise the available evidence on the health and social outcomes, and the health service experiences, of former members of the UK Armed Forces. The report was commissioned by the Department of Health in England, who are responsible, through the National Health Service, for providing appropriate care services for Service personnel once they leave the UK Armed Forces. Hence our focus is on those who have left the Armed Forces, rather than those who are veterans of a particular campaign but are still serving.

In the literature on military personnel, the term “veterans” is used in two ways. First, it is used for all those who have left the Armed Forces, regardless of which campaign or conflict they served in, or indeed whether they were deployed at all. Second, it is used for all those who served in a particular campaign or conflict (e.g. World War II veterans, Vietnam veterans), regardless of whether they are still serving or have left the service. In the current report, we distinguish between these two uses. For those who have left the Armed Forces, we use “Service-leavers” or, more commonly, “ex-Service personnel”. For those who served in one or more conflicts, we use “veterans”, adding the name of the conflict to identify those who served in a particular conflict.

A related issue concerns the definition of “Service”. This definition is fundamental to any attempt to define the ex-Service population, yet the approach taken currently differs from one country to another. These different approaches, and their advantages and disadvantages, have been reviewed elsewhere [2] and so will not be considered further here. For the current report, we use the UK definition, which is anyone who has spent one day or more in the Armed Forces. This is different to the definition that is used in other countries, notably the US. Hence when the focus is on the entire ex-Service population rather than veterans of a particular campaign or conflict, the characteristics of the population covered will inevitably differ between studies based on UK personnel and those based on personnel from other countries.

The majority of the information on ex-Service personnel is from studies of US war veterans. Such studies should be interpreted with caution for the UK because of the differences that exist between the two countries, namely the Vietnam War experience and the existence of the US Veterans Administration that provides dedicated, bespoke medical and psychiatric treatment for ex-Service personnel. In the current report we focus, where possible, on work that examines outcomes for UK personnel.

There are few published studies in which ex-Service personnel have been explicitly considered, either as the focus of the study or as a clearly defined sub-group for which separate findings are presented, and the pool of relevant studies decreases even further when the need to focus on UK personnel is taken into account. We provide a full list of references covering every study that we refer to in the report.

A similar report to this one was produced in 2003 by the Department of War Studies and the Institute of Psychiatry at King’s College London. The 2003 report included a comprehensive review of the available literature on the health and social outcomes of ex-Service personnel, which was published as part of a wider review of cross departmental support and services for military veterans [1]. In the current report, while we draw on this earlier review as appropriate, we focus on sources of information that were not covered by the 2003 review, namely papers that have been published since 2003. Having reviewed the available

information, we present a summary of the available evidence on the physical and mental health status of ex-Service personnel, how they fare in relation to social outcomes such as housing and employment, and their health service experiences. Finally, we present a list of research priorities, outlining for each the progress that has been made so far, the questions that still need to be addressed, and the sorts of studies that could be conducted to address these questions.

In deciding which publications are sufficiently relevant to warrant consideration in the current report, we have exercised informed expert judgement. To compensate for this, we have included a bibliography as well as a list of references. The list of references (Chapter 5), includes all publications to which we refer in the report. In contrast, the bibliography (Chapter 6) includes publications to which we make no reference in the report. The publications in the bibliography are related to, but are not in our view directly relevant to, the focus of the current report. They are included to enable the interested reader to access the wider literature on the health of military personnel.

2 SOURCES OF INFORMATION

2.1 Publications

2.1.1 Overview

In this section, we review the published literature on the health and social outcomes, and health service experiences, of UK ex-Service personnel.

In Table 1 we provide summary information on papers that have been published since 2003, to give a general picture of the literature base. We group these papers by whether they relate directly to the UK and whether they relate directly to ex-Service personnel. For studies that contain specific information on UK ex-Service personnel, we have included every publication we have been able to find. However, for studies that contain information on personnel from the UK but do not contain specific information on ex-Service personnel, and for all studies of personnel from countries other than the UK, we only include publications that, in our view, can be applied to ex-Service personnel from the UK. The “List of references” (Chapter 5) contains only those publications that we directly refer to in the first four chapters of this report. Other studies, which we retrieved through our literature searches but chose not to refer to because we felt they were not applicable to UK ex-Service personnel, are listed in the bibliography (Chapter 6).

The papers in Table 1 are ordered alphabetically by author, with the number in the final column indicating to which of the following categories each paper belongs:

- 1) Ex-Service personnel (UK): papers that contain at least some data on UK ex-Service personnel, even if that is not the focus of the paper.
- 2) Service personnel in general (UK): papers that contain information on UK Service personnel with relevance to ex-Service personnel. Some of these focus exclusively on still-serving personnel, while others focus on a mixed group of serving and ex-serving personnel. The criteria for inclusion in this category are that the paper 1) includes information on UK personnel and 2) does not include specific data or analyses on ex-Service personnel.
- 3) Ex-Service personnel (non-UK): papers that contain information on non-UK ex-Service personnel that, in our view, can be applied to ex-Service personnel from the UK.
- 4) Service personnel in general (non-UK): papers that contain information on non-UK Service personnel with relevance to ex-Service personnel from the UK.

In the sections that follow Table 1, we present a thematic review of the published literature, covering the papers listed in the table and the main findings from papers that were published before 2003.

Table 1. Papers published since 2003 with relevance to ex-Service personnel

Author(s), year	Title	Type	Category
Belik et al, 2009	Relation between traumatic events and suicide attempts in Canadian military personnel	Peer-reviewed journal article	4
Browne et al, 2007	Explanations for the increase in mental health problems in UK reserve Forces who have served in Iraq	Peer-reviewed journal article	2
Browne et al, 2008	How do experiences in Iraq affect alcohol use among male UK Armed Forces personnel?	Peer-reviewed journal article	2
Carpenter et al, 2009	Cancer morbidity in British military veterans included in chemical warfare agent experiments at Porton Down: cohort study	Peer-reviewed journal article	2
Dandeker et al, 2004	Feasibility study on the extent, causes, impact and costs of rough sleeping and homelessness amongst ex service personnel in a sample of Local Authorities in England	Scoping study, published by MoD	1
Dominick K, 2006	Arthritis prevalence and symptoms among US non-veterans, veterans, and veterans receiving Department of Veterans Affairs Healthcare	Peer-reviewed journal article	3
Doyle et al, 2006	Reproductive health of Gulf War veterans	Peer-reviewed journal article (review)	2
Fear et al, 2007	Patterns of drinking in the UK Armed Forces	Peer-reviewed journal article	1
Fikretoglu et al, 2007	Mental health treatment seeking by military members with posttraumatic stress disorder: findings on rates, characteristics, and predictors from a nationally representative Canadian military sample	Peer-reviewed journal article	4
Fikretoglu et al, 2009	Predictors of likelihood and intensity of past-year mental health service use in an active Canadian military sample	Peer-reviewed journal article	4
Fletcher, 2007	Combat Stress, Veterans and Psychological Trauma	Chapter in an edited book	1
French et al, 2004	Screening for physical and psychological illness in the British Armed Forces: II: Barriers to screening – learning from the opinions of Service personnel.	Peer-reviewed journal article	2
Green et al, 2008	Welfare and warfare, an uneasy mix: personal experiences of and organisational responses to emotional and mental health issues in young ex-Service personnel: Literature Review and Methods	Research report, accessed from University webpage	1

Author(s), year	Title	Type	Category
Green et al, 2008	Welfare and warfare, an uneasy mix: personal experiences of and organisational responses to emotional and mental health issues in young ex-Service personnel: Summary of Findings	Research report, accessed from University webpage	1
Hawton et al, 2009	Self-harm in UK armed forces personnel: descriptive and case-control study of general hospital presentations	Peer-reviewed journal article	2
Hoge et al, 2004	Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care	Peer-reviewed journal article	4
Hoge et al, 2006	Mental health problems, use of mental health services, and attrition from military service after returning from deployment to Iraq or Afghanistan	Peer-reviewed journal article	4
Hoge et al, 2007	Association of Posttraumatic Stress Disorder With Somatic Symptoms, Health Care Visits, and Absenteeism Among Iraq War Veterans	Peer-reviewed journal article	4
Hotopf et al, 2004	Risk factors for continued illness among Gulf War veterans: a cohort study	Peer-reviewed journal article	1
Hotopf et al, 2006	The health of UK military personnel who deployed to the 2003 Iraq war: a cohort study	Peer-reviewed journal article	2
Hooper et al, 2008	Cigarette and alcohol use in the UK Armed Forces, and their association with combat exposures: a prospective study	Peer-reviewed journal article	2
Ikin et al, 2007	Anxiety, post-traumatic stress disorder and depression in Korean War veterans 50 years after the war	Peer-reviewed journal article	3
Improving Access to Psychological Therapies (IAPT), 2009	Veterans Positive Practice Guide	Guidance document, accessed from IAPT website	1
Ismail et al, 2008	Chronic fatigue syndrome and related disorders in UK veterans of the 1990-1991 Gulf War: results from a two-phase cohort study	Peer-reviewed journal article	2
Iversen et al, 2005	'Goodbye and good luck': the mental health needs and treatment experiences of British ex-Service personnel	Peer-reviewed journal article	1
Iversen et al, 2005	What happens to British veterans when they leave the Armed Forces?	Peer-reviewed journal article	1
Iversen et al, 2007	Factors associated with heavy alcohol consumption in the U.K. Armed Forces: data from a health survey of Gulf, Bosnia, and era veterans	Peer-reviewed journal article	1

Author(s), year	Title	Type	Category
Iversen et al, 2007	Influence of childhood adversity on health among male UK military personnel	Peer-reviewed journal article	2
Iversen & Greenberg, 2009	Mental health of regular and reserve military veterans	Peer-reviewed journal article (review)	1
Iversen et al, 2009	The prevalence of common mental disorders and PTSD in the UK military: using data from a clinical interview-based study	Peer-reviewed journal article	1
Jacobson et al, 2008	Alcohol use and alcohol-related problems before and after military combat deployment	Peer-reviewed journal article	4
Jacobson et al, 2009	Disordered eating and weight changes after deployment: longitudinal assessment of a large US military cohort	Peer-reviewed journal article	4
Johnsen et al, 2008	The Experiences of Homeless Ex-Service Personnel in London	Research Report, accessed from Royal British Legion website	1
Jones et al, 2006	The burden of psychological symptoms in the UK Armed Forces	Peer-reviewed journal article	2
Jones et al, 2009	Occupational outcomes in soldiers hospitalized with mental health problems	Peer-reviewed journal article	1
Kaplan et al, 2009	Firearm suicide among veterans in the general population: findings from the national violent death reporting system	Peer-reviewed journal article	3
Kapur et al, 2009	Suicide after leaving the UK Armed Forces - a cohort study	Peer-reviewed journal article	1
Klaassens et al, 2008	Mental health of Dutch peacekeeping veterans 10-25 years after deployment	Peer-reviewed journal article	3
Langston et al, 2007	Culture: what is its effect on stress in the military	Peer-reviewed journal article (review)	2
LeardMann et al, 2008	Baseline self reported functional health and vulnerability to post-traumatic stress disorder after combat deployment: prospective US military cohort study	Peer-reviewed journal article	4
MacFarlane et al, 2003	Incidence of cancer among UK Gulf War Veterans: cohort study	Peer-reviewed journal article	2
MacFarlane et al, 2005	Long-term mortality amongst Gulf War Veterans: is there a relationship with experiences during deployment and subsequent morbidity?	Peer-reviewed journal article	2

Author(s), year	Title	Type	Category
Milliken et al, 2007	Longitudinal assessment of mental health problems among active and reserve component soldiers returning from the Iraq war	Peer-reviewed journal article	4
Murphy et al, 2006	Is the increased reporting of symptomatic ill health in Gulf War veterans related to how one asks the question?	Peer-reviewed journal article	2
Murphy et al, 2008	The mental health of veterans	Peer-reviewed journal article (review)	1
National Association of Probation Officers (NAPO), 2008	Ex-Armed Forces Personnel and the Criminal Justice System	Briefing document, accessed from NAPO website	1
National Association of Probation Officers, 2009	Armed Forces and the Criminal Justice System	Briefing document, accessed from NAPO website	1
National Audit Office (NAO), 2007	Leaving the Services	NAO Report, accessed from NAO website	1
O'Toole and Catts, 2008	Trauma, PTSD, and physical health: an epidemiological study of Australian Vietnam veterans	Peer-reviewed journal article	3
O'Toole et al, 2009	The physical and mental health of Australian Vietnam veterans 3 decades after the war and its relation to military service, combat, and post-traumatic stress disorder	Peer-reviewed journal article	3
Richardson et al, 2006	Association of PTSD and depression with medical and specialist care utilization in modern Canadian peacekeeping veterans with health-related disabilities	Peer-reviewed journal article	3
Richardson et al, 2009	Post-traumatic stress disorder and health problems among medically ill Canadian peacekeeping veterans	Peer-reviewed journal article	3
Riddle et al, 2007	Millennium Cohort: the 2001-2003 baseline prevalence of mental disorders in the US military	Peer-reviewed journal article	4
Ryan et al, 2007	Millennium Cohort: enrollment begins a 21-year contribution to understanding the impact of military service	Peer-reviewed journal article	4
Rona et al, 2004	Screening for physical and psychological illness in the British Armed Forces: I: The acceptability of the programme	Peer-reviewed journal article	2

Author(s), year	Title	Type	Category
Rona et al, 2004	Screening for physical and psychological illness in the British Armed Forces: III: The value of a questionnaire to assist a Medical Officer to decide who needs help	Peer-reviewed journal article	2
Rona et al, 2005	Screening for psychological illness in military personnel	Peer-reviewed journal article (review)	2
Royal British Legion, 2005	Profile of the Ex-Service Community in the UK	Research Report, accessed from Royal British Legion website	1
Royal British Legion, 2006	Profile and Needs: Comparisons between the Ex-Service Community and the UK population	Research Report, accessed from Royal British Legion website	1
Royal British Legion, 2006	Future Profile and Needs of the Ex-Service Community	Research Report, accessed from Royal British Legion website	1
Royal British Legion, 2006	Greatest Welfare Needs of the Ex-Service Community	Research Report, accessed from Royal British Legion website	1
Sareen et al, 2007	Combat and peacekeeping operations in relation to prevalence of mental disorders and perceived need for mental health care: findings from a large representative sample of military personnel	Peer-reviewed journal article	4
Sareen et al, 2008	Canadian military personnel's population attributable fractions of mental disorders and mental health service use associated with combat and peacekeeping operations	Peer-reviewed journal article	4
Sayers et al, 2009	Family problems among recently returned military veterans referred for a mental health evaluation	Peer-reviewed journal article	4
Simmons et al, 2004	Self-reported ill health in male UK Gulf War veterans: a retrospective cohort study	Peer-reviewed journal article	2
Smith et al, 2007	The physical and mental health of a large military cohort: baseline functional health status of the Millennium Cohort	Peer-reviewed journal article	4

Author(s), year	Title	Type	Category
Smith et al, 2008	New onset and persistent symptoms of post-traumatic stress disorder self reported after deployment and combat exposures: prospective population based US military cohort study	Peer-reviewed journal article	4
Smith et al, 2008	Prior assault and posttraumatic stress disorder after combat deployment	Peer-reviewed journal article	4
Smith et al, 2009	PTSD prevalence, associated exposures, and functional health outcomes in a large, population-based military cohort	Peer-reviewed journal article	4
Solomon et al, 2006	Trajectories of PTSD: A 20-year longitudinal study	Peer-reviewed journal article	4
Sundin et al, 2009	PTSD after deployment to Iraq: conflicting rates, conflicting claims	Peer-reviewed journal article (review)	2
Taft et al, 2008	An examination of family adjustment among Operation Desert Storm veterans	Peer-reviewed journal article	4
Thoresen et al, 2003	Suicide in peacekeepers--a cohort study of mortality from suicide in 22,275 Norwegian veterans from international peacekeeping operations	Peer-reviewed journal article	3
Toomey et al, 2007	Mental health of US Gulf War veterans 10 years after the war	Peer-reviewed journal article	4
van Staden et al, 2007	Transition back into civilian life: a study of personnel leaving the UK Armed Forces via "military prison"	Peer-reviewed journal article	1
Venables et al, 2009	Mortality in British military participants in human experimental research into chemical warfare agents at Porton Down: cohort study	Peer-reviewed journal article	2

2.1.2 Methodological considerations

Unwin et al [3] was the first publication on the King's Military Cohort study, a longitudinal prospective study of a large, randomly selected military cohort, begun in 1997 at King's College London, and initiated in the light of the "Gulf War Syndrome" controversy. This study involved three randomly selected cohorts, all of whom had been in-Service in 1991: a Gulf cohort, comprising personnel who served in the Gulf; a Bosnia cohort, comprising personnel who served in Bosnia but not in the Gulf; and an "Era" group, comprising personnel who neither served in the Gulf nor served in Bosnia. The main finding of Unwin et al was that, in comparison with the other cohorts, Gulf veterans were more likely to report greater fatigue, more symptoms, and greater psychological distress [3]. This paper is the main source of detailed information on the methods by which the King's Military Cohort was constructed and it is for this reason that it has been included here. Further studies from this cohort are discussed later in this chapter.

Hotopf et al [4] was the first publication on the KCMHR 2003 cohort. The study compared health outcomes in a random sample of UK Armed Forces personnel who were deployed to the 2003 Iraq War with those in personnel who were not deployed. Participants completed a questionnaire covering the nature of the deployment and health outcomes, which included symptoms of post-traumatic stress disorder, common mental disorders, general wellbeing, alcohol consumption, physical symptoms, and fatigue. The participation rate was 62% (n=4,722) in the deployed sample, and 56% (n=5,550) in the non-deployed sample. The effect of deployment was different for reservists compared with regulars. In regulars, only presence of multiple physical symptoms was weakly associated with deployment, whereas for reservists deployment was associated with common mental disorders, PTSD and fatigue. There was no evidence that later deployments, which were associated with escalating insurgency and UK casualties, were associated with poorer mental health outcomes. This paper is the main source of detailed information on the methods by which the KCMHR 2003 cohort was constructed and it is for this reason that it has been included in this section. Further studies from this cohort are discussed at various points throughout the remainder of this chapter.

Ryan et al [5] outlined the methods used to recruit, and the baseline characteristics of, the participants of the Millennium Cohort study, the largest prospective study ever undertaken in the US military. This study uses a phased enrolment strategy to eventually include more than 100,000 US service members who will be followed up through the year 2022, even after leaving military service. Subjects will be linked to Department of Defense and Veterans Affairs databases and surveyed every 3 years to obtain objective and self-reported data on exposures and health outcomes. The first enrolment phase was completed in July 2003 and resulted in 77,047 consenting participants, well representative of both active-duty and Reserve/Guard Forces. Just as data on the KCMHR 2003 cohort have been used to address a range of questions for the UK, so data on the Millennium cohort have been used to address a range of questions for the US. Studies based on the Millennium cohort are discussed later in this chapter.

2.1.3 Mortality

2.1.3.1 Suicide

Kapur et al [6] studied suicide among those who left the UK Armed Forces between 1996 and 2005. They carried out a retrospective cohort study of ex-Armed Forces personnel by linking national databases of discharged personnel with data on suicide deaths (deaths receiving either a suicide or an undetermined verdict), making comparisons with both the general and serving populations. In addition, they conducted a case-control analysis on the subset of this cohort who were in contact with mental health services in the 12 months prior to death. During the study period, 233,803 individuals left the Armed Forces and 224 died by suicide. Although the overall rate of suicide was no greater in ex-Service personnel than in the general population, the risk of suicide in men aged 24 and under who had left the Armed Forces was approximately two to three times higher than the risk for the same age group in the general and serving populations. In contrast, the risk of suicide for men aged 30–49 was lower than that in the general population. The rate of contact with specialist mental health services was lowest in the age groups at greatest risk of suicide (those aged 24 and under). The authors conclude that, while young men who leave the UK Armed Forces are at increased risk of suicide, it is not known whether this primarily reflects pre-Service vulnerabilities or factors related to service experiences or discharge. In terms of preventative measures, they suggest practical and psychological preparation for discharge and encouraging appropriate help-seeking behaviour once individuals have left the services.

An earlier study [7] of suicide among serving regular members of the UK Armed Forces showed broadly similar results. The UK Armed Forces had fewer suicides than expected compared with the UK general population. This was the case for each of the three Services (Naval Service, Army and Royal Air Force) and for each age group except Army males under 20 years of age where there were 1.5 times more deaths than expected.

Kaplan et al [8] investigated the role of firearm use in suicide deaths among US ex-Service personnel. The analyses were based on data on 28,534 suicide deaths from the 2003 to 2006 National Violent Death Reporting System. Across all age groups and both sexes, ex-Service personnel had higher firearm suicide rates than the general population. Among males and females, personnel aged 18-34 had the highest firearm and total suicide rates. After adjusting for age, marital status, race, and region of residence, suicide deaths in male and female ex-Service personnel were, respectively, 1.3 and 1.6 times more likely to involve firearms than those in the general population. The authors highlighted the high rate of firearm use in females.

Thoresen et al [9] conducted a cohort study of mortality from suicide in 22,275 Norwegian veterans from international peacekeeping operations. Cause-specific mortality was identified in the population of Norwegian peacekeepers having participated in Army missions in the years 1978-1995. General population data were used for comparison. Standardized Mortality Ratios (SMRs) were calculated for different suicide methods and certain peacekeeping-related variables. Marital status was available for each year and controlled for by using separate suicide rates for unmarried, married and divorced. A moderately, but significantly, increased SMR of 1.4 for suicide was found among the former peacekeepers (95% confidence interval = 1.1-1.8). However, after adjusting for marital status, the SMR was no longer significant (SMR = 1.1, 95% confidence interval = 0.9-1.4). The number of

suicides by firearms and carbon monoxide poisoning was significantly higher than would be expected in the general population of men.

Belik et al [10] investigated whether exposure to particular types of traumatic events was differentially associated with suicide attempts in a representative sample of active military personnel. Data came from the Canadian Community Health Survey: Mental Health and Well-Being Canadian Forces Supplement (CCHS-CFS), a cross-sectional survey that provided a comprehensive examination of mental disorders, health, and the well-being of currently active Canadian military personnel (n = 8,441; age = 16 to 54 years; response rate = 81%). Respondents were asked about exposure to 28 traumatic events that occurred during their lifetime and suicide attempts were measured using a question about whether the person ever "attempted suicide or tried to take [his or her] own life." The prevalence of lifetime suicide attempts for currently active Canadian military men and women was 2.2% and 5.6%, respectively. Sexual and other interpersonal traumas (for example, rape, sexual assault, spousal abuse, child abuse) were significantly associated with suicide attempts in both men and women, even after adjusting for sociodemographic factors and mental disorders. The number of traumatic events experienced was positively associated with increased risk of suicide attempts, indicating a dose-response effect for exposure to trauma.

Two reports published in the 1970s described successful pilot programmes for suicide prevention. One involved using a CBT-like approach to instil coping skills [11]; the other involved using a buddy system to combat self-destructive behaviour [12]. Neither focused on ex-Service personnel.

2.1.3.2 Alcohol-related deaths

In what is now an old study (albeit of UK personnel), Lynch [13] found that, between 1968 and 1977, 12% of deaths in off-duty Army personnel were associated with an elevated blood alcohol concentration. Of these, 50% were road traffic accidents, 23% were due to acute alcohol poisoning, and 9% were suicide. The Army rate of acute alcohol poisoning deaths in 1987 was 2.7 per 100,000 compared with a general UK rate of 1.2. British Soldiers who served in the Rhine had an increased rate of 5.1 deaths per 100,000, a finding that the author concluded was due to the ready availability of cheap alcohol in Germany.

2.1.3.3 Non-disease related deaths more generally

MacFarlane et al [14] compared UK personnel who served in the Gulf War with a matched era cohort of personnel who were not deployed to the Gulf. Gulf veterans had a slightly reduced incidence of mortality from diseases such as cancer but a higher incidence of non-disease-related deaths.

In a later study, MacFarlane et al [15] investigated whether there remains an excess of non-disease-related deaths in UK Gulf War veterans 13 years after deployment and, for the first time, whether there is a relationship between experiences reported in the Gulf, post-war symptoms, and subsequent mortality. This was a cohort study with follow-up from 01 April 1991 (the end of the Gulf War) to 30 June 2004. Participants were 53,462 Gulf War veterans and a cohort of military personnel, matched for age, sex, rank, service and level of fitness, who were not deployed to the Gulf. There was no difference, 13 years after the end of the Gulf War, in the overall mortality of Gulf War Veterans. The excess in non-disease-related deaths previously reported was confined to the initial 7 years of follow-up. Experiences

reported during Gulf deployment did not influence subsequent risk of dying. Excessive symptomatology was not related to future risk of death.

2.1.4 Physical health

2.1.4.1 Reproductive health

Doyle et al [16] reviewed the literature on the reproductive health of Gulf War veterans. All the studies examined had methodological limitations, making interpretation difficult. Nonetheless, the authors concluded that for male veterans there was no strong or consistent evidence for an effect of service in the first Gulf War on the risk of major, clearly defined, birth defects or stillbirth in offspring conceived after deployment. Effects on specific rare defects could not be excluded, as none of the studies had the statistical power to examine them. For miscarriage and infertility, there was some evidence of small increased risks associated with service, but the role of bias is likely to be strong. For female veterans, there was insufficient information to make robust conclusions, although the weight of evidence to date does not indicate any major problem associated specifically with deployment to the Gulf. None of the studies had been able to examine risk according to particular exposures, and so possible associations with specific exposures for smaller groups of exposed veterans could not be excluded. The authors suggest that the way to address the question of veterans' reproductive health with confidence in the future is through prospective surveillance following deployment.

2.1.4.2 Chronic fatigue syndrome

Ismail et al [17] studied the prevalence of chronic fatigue syndrome and related disorders in UK veterans of the 1990-1991 Gulf War, using baseline data from the original King's Military Cohort. Gulf veterans who reported physical disability at baseline (n=111) were compared with non-Gulf veterans who reported similar levels of physical disability (n=133). Screening for known medical and psychiatric conditions was conducted to exclude medical explanations for disability and symptomatic distress. Standardised criteria for chronic fatigue syndrome, chronic fatigue and fibromyalgia were used. Disabled Gulf veterans were more likely to be overweight, have elevated c-glutamyl transferase levels and screen positive for hypertension. There were no other significant differences in clinical markers of medically explainable conditions. Disabled Gulf veterans were more likely than similarly disabled non-Gulf veterans to meet the criteria for chronic fatigue syndrome. Rates for other medically unexplained conditions were not significantly increased. These findings suggest that symptoms of chronic fatigue syndrome account for a significant part of the symptomatic distress reported by Gulf veterans.

2.1.4.3 Cancer

MacFarlane et al [18] investigated whether incidence rates of cancer were higher in UK service personnel who were deployed in the Gulf War than in those who were not and whether any increased risk of cancer was related to self reported exposures to potentially hazardous material during the period of deployment. This was a cohort study with follow up from April 1991 (the end of the Gulf War) to July 2002. Participants were 51,721 Gulf War veterans and 50,755 Service personnel matched for age, sex, rank, service, and level of

fitness who were not deployed in the Gulf (the Era cohort). There were 270 incident cancers among the Gulf cohort and 269 among the Era cohort, with no excess in site specific cancers among the Gulf cohort. Adjustment for smoking and alcohol consumption did not alter these results. In the Gulf cohort, risk of cancer was not related to multiple vaccinations or to exposure to pesticides or depleted uranium during deployment. The authors concluded that there was no current excess risk of cancer overall or of site specific cancers in Gulf War veterans. They stressed, however, that the long latent period for cancer necessitates the continued follow up of these cohorts.

2.1.4.4 Arthritis

Dominick et al [19] compared arthritis prevalence and symptoms between US ex-Service personnel and the general US population, and between ex-Service personnel who were US Department of Veterans Affairs (VA) healthcare users and those who were not. Study participants were 123,395 respondents from 36 states who completed the arthritis module of the 2000 Behavioural Risk Factor Surveillance System, a state-based, random-digit-dialled survey of the non-institutionalized US population aged 18 or over. Ex-Service personnel were more likely to report doctor-diagnosed arthritis than the general population (32% vs. 22%), and VA healthcare users were more likely to report doctor-diagnosed arthritis than nonusers (43% vs. 30%). Differences remained in analyses controlling for demographic characteristics. Among respondents with arthritis, ex-Service personnel were more likely to report chronic joint symptoms and activity limitation than members of the general population, and VA healthcare users were more likely to report chronic symptoms and activity limitation than nonusers. Demographic factors predicting doctor-diagnosed arthritis were similar among the three groups.

2.1.4.5 Disordered eating and weight changes

Jacobson et al [20] used longitudinal data from Millennium Cohort Study participants who completed baseline (2001-2003) and follow-up (2004-2006) questionnaires (n=48,378) to investigate new-onset disordered eating and weight changes in a large military cohort. After adjustment for baseline demographic, military, and behavioural characteristics, deployment was not significantly associated with new-onset disordered eating in women or men. However, deployed women reporting combat exposures were 1.8 times more likely to report new-onset disordered eating and 2.4 times more likely to lose 10% or more of their body weight compared with women who deployed but did not report combat exposures. Despite no significant overall association between deployment and disordered eating and weight changes, deployed women reporting combat exposures represent a subgroup at higher risk for developing eating problems and weight loss.

2.1.4.6 PTSD and physical health

Richardson et al [21] examined the relationship between PTSD symptom severity and four significant health conditions (gastrointestinal disorders, musculoskeletal problems, headaches and cardiovascular problems). Participants included 707 Canadian peacekeeping veterans with service-related disabilities, from a random, national Canadian survey. PTSD severity was significantly related to gastrointestinal disorders, musculoskeletal problems, and headaches, but not to cardiovascular problems. Controlling for demographic factors did not affect these relationships.

O'Toole and Catts [22] examined the relative contributions to physical health of combat trauma exposure and posttraumatic stress disorder (PTSD), which have both been implicated separately in poorer physical health but whose unconfounded effects have not been teased out. Data from an epidemiological study of Australian Vietnam veterans, which used personal interviews and standardized physical and psychiatric health assessments, provided the means to assess the independent and joint effects of psychological trauma exposure and PTSD on a wide range of self-reported measures of physical health. Greater health service use and more recent health actions were associated more strongly with PTSD, which was also associated with a range of illness conditions (asthma, eczema, arthritis, back and other musculoskeletal disorders, and hypertension), both before and after controlling for potential confounders. In contrast, combat exposure and peritraumatic dissociation were more weakly associated with a limited number of unconfounded physical health outcomes. The authors conclude that PTSD, rather than combat exposure or peritraumatic dissociation, is associated with a pattern of physical health outcomes that is consistent with altered inflammatory responsiveness.

2.1.5 Mental health

2.1.5.1 Context

The introduction of the term Post Traumatic Stress Disorder (PTSD) in 1980 indicated recognition that long term psychiatric disorder could be the result of adult traumatic events, particularly combat, rather than merely the expression of genetic vulnerability or early life experiences. A seminal 50-year follow-up by Lee et al [23] showed the importance of distinguishing between combat related symptoms and memories on the one hand and actual disability on the other. In this study, men who had been in combat maintained memories of it for the rest of their lives but this did not affect their functioning; indeed, almost certainly because of selection bias (where, for example, those who were better educated were more likely to serve), they actually did better in their lives than those without combat exposure. However, the minority who emerged from World War II with psychiatric disorder fared badly in later life.

The literature on the Vietnam War shows that, while there was little evidence of such casualties in the early years of the war, high numbers of psychiatric casualties appeared to emerge later in the conflict, with many men claiming that their experiences during the war had contributed to psychiatric ill health or social maladjustment on returning home. There is a huge volume of literature on Vietnam but because the majority of the studies were conducted retrospectively it is hard to remove the influence of the post-Vietnam social and political climate in the US. Retrospective reports of war experience are inevitably coloured by current circumstances and the climate that follows the war.

An important lesson from Vietnam is that the context of conflict is key in predicting what difficulties serving personnel may have on return. The important lesson more generally is that no two conflicts are alike – traditional warfighting differs from counter insurgency or peacekeeping, and wars won have different sequelae to wars lost. For example, whilst the focus of much psychiatric or psychological research on the health of US Vietnam veterans is on combat experiences in theatre and the subsequent development of PTSD, there is also a body of scholarly opinion, largely from historians and social scientists, that places a greater

emphasis on the political landscape back in the US after the end of the war, including stigma, economic downturn, the problems of a war lost, and the social creation of the stereotype of the “Vietnam Veteran” as depressed, dangerous, drug addicted, and disaffected [24].

Most of the Vietnam literature comes from the US. However, a study of Australian Vietnam veterans [25] showed that in those who did not meet the criteria for PTSD a range of psychiatric disorders (such as agoraphobia, generalised anxiety, depression, dysthymia, panic disorder, obsessive-compulsive disorder and somatisation) were more likely among men who saw higher levels of combat exposure. This finding raises the important possibility that, whilst PTSD grabs the attention of the media and the general public, the true burden of mental health problems among ex-Service personnel lies in the more common and mundane diagnoses of depressive illness and alcohol dependence.

2.1.5.2 Prevalence of mental health problems

Iversen et al [26] conducted a clinical interview study of a sub-sample of the KCMHR 2003 cohort using a 2-phase survey technique in which possible psychiatric cases were identified from the main cohort using the General Health Questionnaire (GHQ). A proportion of those who scored above the threshold for 'GHQ caseness' (score \geq 3) were selected for interview, together with a random sample of the non-GHQ cases. 821 participants were interviewed, of which 117 were ex-Service personnel; the response rate was 76%. The weighted prevalence of common mental disorders and PTSD symptoms was 27% and 5%, respectively. The most common diagnoses were alcohol abuse (18%) and neurotic disorders (14%). There were no statistically significant differences between still-serving and ex-serving personnel, although there was a trend for the prevalence of neurotic disorders to be higher in the ex-serving personnel (12% vs. 19%). There was no health effect of deploying for regular personnel, but an increased risk of PTSD for reservists who deployed to Iraq or other recent deployments compared with reservists who did not deploy. The prevalence of depression, PTSD symptoms or subjective poor health was similar between regular US and UK Iraq combatants.

Jones et al [27] assessed the prevalence of psychological symptoms in the UK Armed Forces during periods of relatively low deployment. A survey of 4,500 randomly selected UK service personnel was carried out in 2002. The questionnaire included the General Health Questionnaire (GHQ-12), the post-traumatic stress disorder checklist (PCL), 15 symptoms and an assessment of alcohol intake. A total of 20% were above the cut-off for GHQ-12, 15% for symptoms, 12% for alcohol intake and 2% for PCL. Gender, age, excessive drinking and smoking were independently associated with most outcomes of interest. Number of deployments was independently associated with multiple symptoms and excessive drinking. Symptoms of traumatic stress were more common in the Army and in lower ranks. The authors concluded that psychological symptoms are highly prevalent in UK Armed Forces, and that many risk factors are associated with measures of psychological ill-health. This sample were then followed up after the start of the Iraq War to model the impact of mental health screening [28].

Riddle et al [29] described the baseline prevalence of mental disorders in the Millennium Cohort. Analyses suggested that although the cohort compared favourably to other populations, there were military subpopulations, including women, Army members, those who were younger, less educated, single, white or enlisted, and those whose service was

short-term, who were at greater risk for some mental disorders. Such baseline data are essential to assessing long-term mental health morbidity in US Service personnel.

2.1.5.3 *Self-harm*

Hawton et al [30] investigated the characteristics of UK Service personnel presenting to hospital between 1989 and 2003 following self-harm and compared these with the characteristics of matched controls from the general population who had self-harmed. 166 Service personnel presented with self-harm during the study period, of whom 72% were male and 63% were aged under 25 years. Relationship problems (62%), employment problems (44%) and alcohol misuse (41%) were common. Fewer Service personnel than controls had evidence of current or past psychiatric disorders or treatment or a prior history of self-harm, and their suicidal intent was lower (males only). Of 64 people in the Armed Forces who presented during the first 9 years of the study period, 1 (<2%) had died (from natural causes) by the end of 2000, compared with 9 (5%) of the controls, 6 of whom died by probable suicide. Self-harm by Armed Forces personnel may often be a response to interpersonal and employment problems complicated by alcohol misuse, with relatively low suicide intent.

2.1.5.4 *PTSD*

Hoge et al [31] studied 2,863 US soldiers 1 year after their return from combat duty in Iraq, 17% of whom met screening criteria for PTSD. PTSD was significantly associated with lower ratings of general health, more sick call visits, more missed workdays, more physical symptoms, and high somatic symptom severity. These associations remained significant after controlling for being wounded or injured.

Smith et al [32] used baseline Millennium Cohort data (2001 to 2003) on 75,156 US military members to assess the population-based prevalence of PTSD symptoms, self-reported exposures, and functional health as measured by the Medical Outcomes Study Short Form 36-Item Health Survey for Veterans (SF-36V). PTSD diagnosis without current symptoms was reported by 953 respondents (1.2%, weighted); 1,490 respondents (2.1%, weighted) reported no diagnosis but reported PTSD symptoms, and 287 respondents (0.4%, weighted) reported diagnosis and current symptoms. Self-reported exposure to chemical or biological warfare agents, protective countermeasures, or hearing alarms was associated with PTSD symptoms independent of other combat-like exposures. However, compared with the overall cohort, lower mental health summary means were found for those reporting current PTSD symptoms (mean = 27.8), current symptoms and diagnosis (mean = 24.6), and diagnosis without current symptoms (mean = 47.5). The overall prevalence of PTSD was 2.0%, which is lower than has been reported in other US studies, while the finding that self-reported threatening exposures were significantly associated with PTSD symptoms is consistent with the rest of the literature. The findings suggest that mental and physical health scores are diminished in those with current PTSD symptoms but increase towards normal levels with resolution of PTSD symptoms.

LeardMann et al [33] investigated whether baseline functional health status, as measured by the SF-36V, predicts new onset symptoms or diagnosis of PTSD among deployed US military personnel with combat exposure. Participants were combat deployed members who completed Millennium Cohort baseline (2001-2003) and follow-up (2004-2006) questionnaires. Of the 5,410 eligible participants, 395 (7%) had new onset symptoms or diagnosis of PTSD at the time of follow-up. Individuals whose baseline mental or physical

component summary scores were below the 15th centile had two to three times the risk of symptoms or diagnosis of PTSD by follow-up compared with those in the 15th to 85th centile. Of those with new onset symptoms or diagnosis of PTSD, 58% were participants with scores below the 15th centile at baseline. These findings show that low mental or physical health status before combat exposure significantly increases the risk of symptoms or diagnosis of PTSD after deployment. This finding has been replicated in the latest Medical Surveillance Monthly report (MSMR), based on 208,876 assessments. The authors suggest that more vulnerable members of a population could potentially be identified and may benefit from interventions targeted to prevent new onset PTSD, although it is not clear what these interventions might be. The recent paper from Nevin [34] also casts doubt on the ability of pre deployment screening to detect those at risk (see section 2.2.9).

Sundin et al [35] reviewed the literature on PTSD after deployment to Iraq. They summarised prevalence estimates of PTSD, discussing the discrepancies in relation to methodological differences between studies. The review was limited to population-based studies with a minimum sample size of 300; studies based on helpseeking samples were excluded. 60 possible papers were identified, of which 19 fulfilled the inclusion criteria. Across these 19 studies, the prevalence of PTSD in personnel deployed to Iraq varied between 1.4% and 31%. Stratifying studies by PTSD measure only slightly reduced the variability in prevalence. Higher levels of PTSD were reported for anonymous surveys of line infantry units than for studies that are representative of the entire deployed population. PTSD prevalence tended to be lower for UK than for US studies; however, when comparisons were restricted to studies with random samples, the prevalence was similar. US studies that have assessed personnel more than once since return from deployment have shown that PTSD prevalence increases over the 12 months following deployment. This has not been confirmed in UK studies. However, the UK studies that have been completed to date have used small samples.

Reports of delayed-onset PTSD [36-49] have typically been based on small scale studies or case reports. No compelling evidence has been presented that a delayed PTSD syndrome exists. Limited as they are, the available studies tend to point to a delay in help-seeking for symptomatic individuals rather than a delay in the onset of symptoms. Prospective cohort studies are needed, to determine the true sequence of events and examine whether delayed help seeking can be distinguished from the delayed onset of symptoms.

2.1.5.5 Self-reported ill-health among Gulf War veterans

Evidence from numerous questionnaire based studies suggests that UK, Canadian, Australian and Danish (but not Saudi) Gulf veterans are more likely to report symptoms across the board, both physical and psychological. An alternative approach [50] of surveying medical records, with hospitalisation for mental health problems as the outcome measure, showed that Gulf War service was associated with a significantly increased risk of suffering from an acute stress reaction, and a lower risk of personality disorder and adjustment reaction.

Murphy et al [51] investigated whether the increased reporting of symptomatic ill health that had been seen in Gulf War veterans was still observed when questions about participants' health were asked without being framed within a Gulf War context. Data from a screening study in which there was no mention of the Gulf War and personnel were not asked about their 1991 service history were used, with record linkage to obtain information on

participation in the Gulf War. Differences in symptoms were found between the Gulf War and non-Gulf War groups, even in the absence of framing.

Simmons et al [52] addressed a similar issue using data from a retrospective cohort study of reproduction and child health. A postal questionnaire was sent to all UK Gulf War veterans and a comparison cohort of Armed Service personnel who were not deployed to the Gulf; the cohort for analysis comprised 42,818 males who responded to the questionnaire. Relative to the comparison group, Gulf War veterans reported higher rates of general ill health, were more likely to have reported at least one new medical symptom or disease since 1990, and were more likely to report higher numbers of symptoms. The strongest associations were for mood swings, memory loss/lack of concentration, night sweats, general fatigue and sexual dysfunction. 6% of Gulf War veterans believed they had Gulf War Syndrome and this belief was associated with the highest symptom reporting. The questionnaire used reflected the focus of the main study, which was on reproduction and child health; it did not focus specifically on the veterans' symptoms. Hence the results, which are consistent with those of other studies of post-Gulf War illness, are an important contribution to the overall findings in this area. Overall, there is now converging and powerful evidence that service in the Gulf has affected the self perception of health or symptom experience, but no evidence of any objective effects such as increased risk of cancer or death.

2.1.5.6 Persistence of symptoms

Hotopf et al [53] studied the risk factors for continued illness among Gulf War veterans, using data from a follow-up study of the King's Military Cohort, the details of which were outlined in an earlier paper [54]. They found that, while a higher number of self-reported exposures at baseline was not associated with poorer outcome at follow-up, older people, those with more severe symptoms at baseline, those with psychological distress and those who believed they were suffering from 'Gulf War Syndrome' all had more fatigue at follow-up [53]. The earlier paper [54] showed that UK Gulf veterans continued to report more symptoms than an equivalent military cohort over 5 years of follow-up.

Toomey et al [55] assessed the prevalence of war era onset mental disorders in US Gulf War veterans and non-deployed veterans 10 years after the war. Gulf War-era onset mental disorders were more prevalent in deployed veterans (18%, n=1,061) compared with non-deployed veterans (9%, n=1,128). The prevalence of depression and anxiety was lower 10 years later in both groups, but remained higher in the deployed group, who also reported more symptoms and a lower quality of life than the non-deployed group. Remission of depression appeared to be related to the presence of comorbid psychiatric disorders and level of education. Remission of anxiety was related to treatment with medication. These findings show that Gulf War deployment was associated with an increased prevalence of mental disorders, psychological symptoms and a lower quality of life beginning during the war and persisting at a lower rate 10 years later.

Smith et al [56] studied new onset and persistence of self reported PTSD in a large population based US military cohort (the Millennium Cohort). Baseline (2001 to 2003) and follow-up (2004 to 2006) data on health outcomes were collected from 50,184 participants. More than 40% of the cohort were deployed between 2001 and 2006; between baseline and follow-up, 24% deployed for the first time in support of the wars in Iraq and Afghanistan. New incidence rates of 10-13 cases of PTSD per 1,000 person years occurred in the Millennium Cohort. New onset self reported PTSD symptoms or diagnosis was identified in

7.6-8.7% of deployers who reported combat exposures, 1.4-2.1% of deployers who did not report combat exposures, and 2.3-3.0% of non-deployers. Among those with self reported symptoms of PTSD at baseline, deployment did not affect persistence of symptoms. The findings emphasise that specific combat exposures, rather than deployment itself, significantly affect the onset of symptoms of PTSD after deployment.

Milliken et al [57] assessed the mental health needs of soldiers returning from Iraq and the association of screening with mental health care utilization. This was a population-based, longitudinal descriptive study of the initial large cohort of 88,235 US soldiers returning from Iraq who completed both a Post-Deployment Health Assessment (PDHA) and a Post-Deployment Health Re-Assessment (PDHRA) with a median of 6 months between the 2 assessments. Soldiers reported more mental health concerns and were referred at significantly higher rates from the PDHRA than from the PDHA. Based on the combined screening, clinicians identified 20% of active and 42% of reserve component soldiers as requiring mental health treatment. Of 56,350 active soldiers, 6,669 (11.8%) endorsed alcohol misuse, but only 134 (0.2%) were referred, and of these only 29 were seen within 90 days. Overall, 12,265 soldiers accessed mental health care, but of these 9,074 (74%) had NOT been identified as needing care by the screening. Although soldiers were much more likely to report PTSD symptoms on the PDHRA than on the PDHA, 49% to 59% of those who had PTSD symptoms identified on the PDHA improved by the time they took the PDHRA. There was no direct relationship of referral or treatment with symptom improvement. Rescreening soldiers several months after their return from Iraq identified a large cohort that was missed on initial screening. As the rescreening took place around 6 months after returning, the findings suggest that the large clinical burden recently reported among veterans presenting to Veterans Affairs facilities exists within months of returning home. The authors of this important paper conclude, however, that “the effectiveness of population based screening was difficult to ascertain”.

Older non-UK studies showed that, after onset, PTSD symptoms tended to remain chronic and unremitting [44, 49, 58-61], with combat veterans with PTSD tending to have a worse prognosis than their civilian counterparts [62]. Whether there is something about combat as a precipitating trauma that makes subsequent PTSD more chronic and treatment resistant, or something about veterans that does the same, is unclear.

Studies of Israeli veterans of the Lebanon and Yom Kippur wars showed the presence of combat stress reaction to be a major risk factor for longer-term disorder. Those who had exhibited combat stress reaction were shown to be at an increased risk of later problems, while those who had not were shown to be at considerably less risk. In 1996, Solomon et al [63] presented findings from an 18-year follow-up showing that those who had suffered from acute combat stress reaction had higher rates of PTSD and more severe symptoms than those who had not suffered, both initially and at follow-up. While the level of distress reported declined in both groups with time, the combat stress group demonstrated lower rates of recovery. More recently, Solomon et al [64] assessed the psychopathological effects of combat in Israeli veterans of the 1982 Lebanon War (n=214), using a prospective longitudinal design in which participants were assessed 1, 2, 3, and 20 years after the war. Of the 214 participants, 131 suffered from combat stress reaction during the war, and 83 did not. Veterans with combat stress reaction were 6.6 times more likely to endorse posttraumatic stress disorder (PTSD) at all four measurements, their PTSD was more severe, and they were at increased risk for exacerbation/reactivation. A qualitative analysis of the profile of PTSD symptoms revealed some time-related changes in the symptom

configuration of veterans who did not suffer from combat stress reaction. In both groups, the course fluctuated, with PTSD rates dropping 3 years post-war and rising again 17 years later. 23% of veterans without combat stress reaction reported delayed PTSD. These findings suggest that the detrimental effects of combat are deep and enduring and follow a complex course, especially in combat stress reaction casualties.

2.1.5.7 Outcomes in those with mental health problems

Jones et al [65] studied occupational outcomes in UK soldiers hospitalized with mental health problems. Hospital admission records were linked to occupational outcome data from a database used for personnel administration. A total of 384 records were identified, each of which was then linked to data on occupational outcomes after the episode of hospitalization. 74% of those admitted to hospital with mental health problems were discharged from the Army prematurely, and 73% of the discharges occurred in the first year following hospitalization. Discharge from the Army was associated with holding a junior rank, completing <5 years military service, having a combat role, being male and receiving treatment from a Community Mental Health Team prior to admission.

There is little literature on the influence of psychiatric injury on occupational attainment, but what there is suggests a negative influence. An association between higher combat levels and lower mean family income in post-Service life was reported for Vietnam veterans [66], as well as for veterans of the Persian Gulf War [67]. Higher rates of unemployment were reported for US veterans of three separate wars (Korea, Vietnam and World War II), but this appeared to be an indirect effect of an increased incidence of alcohol and drug misuse and other mental health problems [68]. A study of Vietnam veterans [69] found that PTSD substantially lowered the likelihood of working and for those who were working their hourly earnings. Similar effects were found for other psychiatric disorders such as depression or anxiety.

2.1.6 Health service use

2.1.6.1 Combat Stress

Fletcher [70] presented a summary of the services provided by Combat Stress (the Ex-Services Mental Welfare Society) and the characteristics of the personnel who use them. In interpreting these data, it should be kept in mind that some 35% of those who access these services refer themselves, and that many of the remainder are referred by the Veterans Welfare Service or by other Service charities. Hotopf et al [71] compared those who accessed the Medical Assessment Programme (MAP), a UK programme that offered clinical assessment to any Gulf War veteran who requested it [72-74], with a matched group of randomly ascertained cases from the King's Military Cohort, showing that those who accessed the MAP represented an entirely different group in terms of demographics, illness beliefs, and symptoms.

The fact that those who access the MAP (or any other referral-based programme) are unrepresentative of the wider population of veterans should be kept in mind when data from such programmes are interpreted. A similar consideration applies to any study where the process of selecting participants is non-random. Nevertheless, Fletcher's findings are of

interest as they give a sense of the types of problems with which ex-Service personnel may present and the services that may be required to respond. Of the many observations that are presented by Fletcher [70], of particular interest are that the average period from military discharge to referral is 14 years and that fewer than 10% of referrals are from NHS medical services. These are consistent with the finding from other studies that ex-Service personnel with mental health problems are reluctant to seek help, particularly medical help.

2.1.6.2 Access to psychological therapies

The Improving Access to Psychological Therapies (IAPT) programme has identified eight special interest groups and produced a corresponding set of “Positive Practice” guides to support its guidance on Commissioning for the Whole Community. The “Veterans’ Positive Practice Guide” [75] is effectively a briefing paper for commissioners. Compiled by an expert group, the IAPT guide provides a useful summary of practical information on the needs of, and the possible barriers to access for, ex-Service personnel.

On needs, the main points include that, of the three Services, soldiers are most at risk of both physical and mental health problems, particularly young single infantrymen; that the most common disorders are depression, anxiety disorders, substance misuse (mostly alcohol) and psychological trauma-related disorders; and that ex-Service personnel with long-standing mental health problems frequently present with multiple co-morbid psychiatric disorders and highly individualised clinical, social, occupational and relationship problems.

On access, the main points include that high levels of social exclusion can mean that some ex-Service personnel do not register with GPs; that the beliefs of these personnel may prevent them from receiving psychological therapies; that General Practitioners and other primary care professionals may not understand that ex-Service personnel may have specific needs linked to their experience of military culture, may mistakenly believe that psychological therapies are not effective for ex-Service personnel, and may believe that treating any physical health problems is a higher priority than treating mental health problems; and that specialist mental health professionals may lack confidence in working with ex-Service personnel and be fearful that such personnel can be violent.

The recommendations focus on the need for commissioners of IAPT services to engage with organisations who have existing expertise in working with ex-Service personnel (including existing traumatic stress services). Of particular note is the suggestion that such organisations be included in the referral pathway for IAPT services.

2.1.6.3 Predictors of service use

Richardson et al [76] assessed the relative associations of PTSD and depression severity with medical and specialist care use in recent peacekeeping veterans with health-related disabilities. The participants were 1,016 male veterans who served in the Canadian Forces from 1990 to 1999, selected from a larger random sample of 1,968 veterans who voluntarily completed an anonymous general health survey conducted by Veterans Affairs Canada in 1999. Among peacekeeping veterans with health disabilities, those with “probable” PTSD reported significantly more medical service use (primary and specialty care combined) than those without PTSD. In multivariate analyses, general medical care intensity (number of visits) was related to increased health problems, greater probable PTSD diagnosis, and

greater depression symptom severity. Depression severity accounted for health care use intensity, with PTSD making a small additional contribution.

Fikretoglu et al [77] investigated the rates, characteristics, and predictors of mental health treatment seeking by military personnel with PTSD. The sample was drawn from the 2002 Canadian Community Health Survey-Canadian Forces Supplement (CCHS-CFS), the first epidemiologic survey of PTSD and other mental health conditions in the Canadian military, which includes 8,441 nationally representative Canadian Forces members. Of those, 549 who met the criteria for lifetime PTSD were included in the analyses. About 70% of those with PTSD consulted with a professional regarding mental health problems. The most frequently consulted professionals, in the last year and ever, included social workers and counsellors, medical doctors and general practitioners, and psychiatrists. Consultations during the last year most often took place in a Canadian Forces facility. Treatment seeking was predicted by cumulative lifetime trauma exposure, index traumatic event type, PTSD symptom interference, and comorbid major depressive disorder. Those with comorbid depression were 3.75 times more likely to have sought treatment than those without.

Fikretoglu et al [78] examined associations between sociodemographic, military, and psychiatric need variables and past-year mental health service use among active Canadian military members. Data were drawn from the first epidemiological survey of mental health in the Canadian Forces, conducted by Statistics Canada in 2002. Of the 8,441 military members who participated in the survey, 1,220 (14%) met criteria for having a mental disorder in the past year. Of these, 767 (63%) contacted a mental health provider in the past year for mental health problems, while 539 (44%) contacted a medical provider. Across the two provider types, the majority of those seeing a provider reported five or fewer mental health visits in the past year. Psychiatric need variables were consistently associated with both a greater likelihood and a greater intensity of service use, as was lower military rank.

Hoge et al [79] studied members of four US combat infantry units (three Army units and one Marine Corps unit) using an anonymous survey that was administered to the subjects either before their deployment to Iraq (n=2,530) or 3 to 4 months after their return from combat duty in Iraq or Afghanistan (n=3,671). Exposure to combat was significantly greater among those who were deployed to Iraq than among those who were deployed to Afghanistan. The percentage of subjects whose responses met the screening criteria for major depression, generalized anxiety, or PTSD was significantly higher after duty in Iraq (16%) than after duty in Afghanistan (11%) or before deployment to Iraq (9%); the largest difference was in the rate of PTSD. Of those whose responses were positive for a mental disorder, 23 to 40% sought mental health care. Those whose responses were positive for a mental disorder were twice as likely as those whose responses were negative to report concern about possible stigmatization and other barriers to seeking mental health care.

2.1.6.4 Cultural considerations

Langston et al [80] reviewed the international literature on the effect of culture on stress in the military. They note that stigmatizing attitudes are present in many military personnel and physical barriers to asking for and receiving care exist; that personnel describe substantial concerns that being labelled as a psychiatric patient will be detrimental to their career; and that perhaps the most important barriers are the hidden ones created by camaraderie and peer support, which may make it difficult for individuals to seek help from the outside. They suggest that Western militaries currently face an uphill struggle to combat the organizational

barriers to care that exist, that senior officers need to address the balance between making accessing care acceptable and maintaining fighting efficiency, and that what is required is a gradual cultural shift.

2.1.7 Other outcomes

2.1.7.1 Alcohol consumption and smoking

Fear et al [81] studied patterns of drinking in UK Service personnel. Of particular relevance for the current report is that of the overall cohort (n=10,272) approximately 18% were ex-Service personnel. For this mixed cohort of serving and ex-serving personnel, the prevalence of hazardous drinking was higher than for the general population (for all ages and both sexes). Binge drinking was associated with being younger, being in the Army, being single, being a smoker and being white, while heavy drinking (AUDIT score 16+) was associated with holding a lower rank, being younger, being single, being in the Naval Service or Army, being deployed to Iraq, not having children, being a smoker, having a combat role and having a parent with a drink or drug problem. Ex-Service personnel were neither more nor less likely to be heavy or binge drinkers than their still-serving counterparts.

Iversen et al [82] investigated the factors associated with heavy drinking, using data from the King's Military Cohort [3]. They compared heavy drinkers (>30 units per week; n=404) with light drinkers (<21 units per week; n=6,972), showing that heavy drinking was associated with being unmarried or separated/divorced, with poorer subjective physical and mental health, and with smoking. 28% of the heavy drinkers and 37% of the light drinkers were ex-Service personnel, and analyses showed the chance of being a heavy drinker to be lower for ex-Service than for still-serving personnel.

Browne et al [83] investigated how experiences in Iraq affect alcohol use among male regular UK Armed Forces personnel, using data from the KCMHR 2003 cohort. After adjustment for sociodemographic and military factors, and the presence of psychological distress, heavy drinkers were more likely to have had major problems at home during and following their deployment. Being deployed with their parent unit, medium to high in-theatre unit comradeship and poor unit leadership were also associated with heavy drinking. These findings show that deployment experiences and problems at home during and following deployment, as well as the occupational milieu of the unit, influence the risk of heavy drinking. Overall these findings confirm that deployment, during which personnel are largely "dry", is associated with a reinstatement of drinking at higher levels than pre-deployment, albeit against a high baseline.

Hooper et al [84] studied cigarette and alcohol use in the UK Armed Forces and their association with combat exposures. While retrospective studies of military personnel and survivors of community disasters suggest a link between traumatic exposure and substance use, this was the first study to investigate this association prospectively in a military population. A representative cohort of members of the UK Armed Forces was recruited into a longitudinal study, with 1,382 people surveyed at baseline, and 941 followed up around 3 years later. Alcohol and cigarette use were assessed on both occasions, and combat exposures during this time were assessed at follow-up. Alcohol consumption and the prevalence of binge-drinking increased over the course of the study. The increase in alcohol

consumption was greater in those subjects who had been deployed, in particular in those who thought they might be killed or who experienced hostility from civilians while on deployment. The effects of these combat exposures were strongest in those most recently deployed. In contrast, cigarette smoking declined during the 3 years of the study.

Jacobson et al [85] investigated whether deployment with combat exposures was associated with new-onset or continued alcohol consumption, binge drinking, and alcohol-related problems. Data were from Millennium Cohort Study participants who completed both a baseline (2001 to 2003; n=77,047) and follow-up (2004 to 2006; n=55,021) questionnaire (follow-up response rate = 71%). After exclusion criteria were applied, the analyses included 48,481 participants (active duty, n=26,613; Reserve or National Guard, n=21,868). Of these, 5,510 deployed with combat exposures, 5,661 deployed without combat exposures, and 37,310 did not deploy. Reserve and National Guard personnel who deployed and reported combat exposures were significantly more likely to experience new-onset heavy weekly drinking, binge drinking, and alcohol-related problems compared with non-deployed personnel. The youngest members of the cohort were at highest risk for all alcohol-related outcomes. Overall, these recent studies show that deployment is associated with an increased risk of subsequent drinking.

2.1.7.2 *Crime and prison*

The National Association of Probation Officers (NAPO) have published two briefing papers [86, 87] on ex-Service personnel in the criminal justice system. In the first [86], they report estimates suggesting that between 5% and 17% of the UK prison population are ex-Service personnel and summarise the findings of 74 case studies from probation officers working in 22 of the 42 Probation Areas in England and Wales. The lower figure for the proportion of ex-Service personnel in the prison population comes from an annual Home Office survey. For this survey, which covers 2,000 prison leavers, results are available for three years: 2001, 2003 and 2004. The proportion with previous Armed Forces experience was 6%, 4% and 5% respectively for these three years. In contrast, the 17% figure comes from a pilot study in a single prison (HMP Dartmoor).

In summarising the findings from the 42 case studies, NAPO note that the majority of ex-Service prisoners were suffering at some stage from PTSD, that the majority were convicted of offences that were violent and drug or alcohol related, and that very few had received any counselling or support at any time after discharge. They also note that their ex-Service status is rarely identified at the point of arrest or admission to custody.

In the second paper [87], NAPO added an estimate of the number of ex-Service personnel under community supervision. They reported that the majority of staff members surveyed had at least one ex-Service individual as part of their caseload. They then combined this estimate with data on staff numbers to derive an overall estimate of 12,000 for the number of ex-Service personnel under community supervision.

This second paper [87] also included information from case studies of ex-Service personnel under community supervision. They received information on 90 current cases from 62 different probation offices across 30 of the 42 probation areas in England and Wales. The findings from these case studies were similar to those reported earlier for ex-Service personnel in prison. The most common offence was violence occurring in a domestic setting; most were either drug or alcohol related. Most of those convicted report problems with

adjusting to civilian life and a lack of appropriate support. Many comment negatively on the effect of the culture of heavy drinking in the Armed Forces.

NAPO's recommendations include better support on discharge from the Armed Forces and referral to relevant agencies if individuals do enter the criminal justice system. They also recommend that the Armed Forces address the effects of alcohol and drug misuse by personnel and provide programmes, in both military and community settings, to deal with the consequences of domestic violence. However, their findings are based on small scale surveys and case studies. Not until the results from studies that are currently being conducted by DASA and KCMHR are available will it be possible to comment with any authority on ex-Service personnel in the criminal justice system.

A report showing annual figures for charges tried by Army Courts Martial in a series of 5-yearly intervals from 1960 to 1980 [88] showed an increase in the incidence of non-violent crime from 1960 to 1980, mirroring the increases seen over this period in the general population. Violent offenders were observed to be almost exclusively male and generally young. Approximately 80% of such offenders were private soldiers, and 92/105 had been drinking heavily at the time of the offence, but only 10% had a previous history of offending. The most common targets were fellow Service personnel.

Older US studies of Vietnam veterans suggested that higher combat exposure predisposes military personnel to criminality in their post-Service life [89-94]. However, as the studies were based on retrospective self-report, there is a considerable risk of non-random recall bias and confounding. In relation to other predictors, the military literature closely mirrors the literature on civilians. The pre-enlistment risk factors for later crime are predictable and understandable, just as they are for civilians.

2.1.7.3 Homelessness

Two studies conducted in the 1990s [95, 96] suggested that ex-Service personnel may constitute 20 to 25% of the UK homeless population. Another UK study [97] showed that 70% of homeless ex-Service personnel had been in the Army; that most had been 18 or younger when they joined the Forces; that half were single and never married, one in ten were widowed, and one in three were divorced or separated; and that one in three had been homeless for 20 years or more.

A comparison of the civilian and ex-Service components of the UK homeless population [96] showed that ex-Service personnel tended to be older and to have been homeless for longer. Ex-Service personnel were more likely than their civilian counterparts to have been affected by alcohol dependence or physical health problems, but less likely to have drug dependence or mental health problems. Among both ex-Service personnel and their civilian counterparts, the most common trigger for homelessness was the breakdown of a relationship, confounded by unemployment. It was suggested [98] that whether an individual becomes homeless reflects a complex interplay of many pre-military and non-military factors, with military factors themselves playing a relatively minor role.

Data from the US, where the Veterans Affairs (VA) program has afforded a unique opportunity to explore the correlates of post-Service homelessness, consistently show that ex-Service personnel (especially Army) are over-represented in the homeless community [99-100]. Over half of these have obvious psychiatric problems or are substance dependent; they do badly despite VA benefits [101]. Pre-military factors are important, just as they are in

civilian homelessness, with childhood history of abuse or delinquency predicting later social exclusion.

Dandeker et al [102] conducted a feasibility study to examine and develop methods to be used in a future study of the nature, costs and extent of rough sleeping and homelessness amongst ex-Service personnel in England. They concluded that:

- It is difficult to draw firm conclusions from the UK literature as the existing studies on ex-Service homelessness in the UK are almost exclusively small-scale surveys with small sample sizes ($n < 100$), and difficult to apply findings from the US studies that comprise the vast majority of the international literature as there are important differences between the Veteran Affairs system in the US and ex-Service provision in the UK.
- Small as they are, the UK studies suggest that, compared with their civilian counterparts, homeless individuals with an Armed Forces background are older, homeless for longer, more likely to have alcohol problems and physical disability, and less likely to have drug problems and mental health difficulties.
- There are no accurate figures on the prevalence of ex-Service personnel in the homeless population.
- Those who appear to be most at risk for homelessness and other related difficulties in the years following their discharge from the Armed Forces are 1) those who leave the Armed Forces after failing basic training or through administrative or medical discharges and 2) those who have served in the Armed Forces for many years and who, on discharge, find the transition to civilian life very difficult.
- The most feasible and appropriate approach for researching the impact of rough sleeping and homelessness on health, welfare and employment is a prospective follow up study of participants assessed on presentation to the homeless services and at subsequent follow-up periods. Tracking from leaving the Services would be too costly as most ex-Service personnel do not become homeless for some time post discharge.
- An alternative, although less robust, approach would be a study that retrospectively attempted to assess the impact of homelessness on health and welfare by examining pathways to homelessness and the life events and interventions that have moderated the impact on health and welfare.
- Pathways to homelessness appear to be very different in the ex-Service and civilian homeless. There is a need to look at the stages at which both groups become vulnerable and how life events compound their inability to find settled or stable accommodation.

The value of the Dandeker et al publication is that it both details the difficulties involved in studying this hard to reach population and suggests feasible strategies for doing so. We are not aware of subsequent studies in which the suggested strategies have been employed. The report by Johnsen et al, which was published by the Royal British Legion in 2008 [103], used existing statistics on service use to estimate the proportion of the homeless population who are ex-Service personnel and existing data combined with findings from interviews with

ex-Service personnel to estimate the characteristics of homeless ex-Service personnel in London. Johnsen did follow a group (n=32) of homeless ex-Service personnel longitudinally, but for 1 year only.

2.1.7.4 Family or relationship problems

Older US studies found no consistent differences in indicators of mental health between children of military families and children of civilian families [104-106], while comparisons within the military showed that officers' children tended to be better adjusted than those of enlisted soldiers [107]. Factors that would increase a military family's vulnerability to difficulties around deployment were found to be largely predictable. Younger, more inexperienced parents fare worse, particularly if there is reduced extended family support. Partners who isolate themselves, who have poor communication skills, or are unkeen to seek help also find separation most difficult, particularly if their children have behavioural problems. Finally, there was some evidence, albeit from a study of just five families where the father suffered from PTSD as a result of combat experience during World War II [108], of the father's trauma having "long term, transgenerational effects". Despite the very small sample size, this research has guided the Veterans Administration in the US in setting up treatment programmes for the children of traumatised veterans (particularly those from Vietnam).

The problems of service spouses have been well described: sudden or extended family separations, a partner in danger, frequent moves to alien environments, and a rigid social hierarchy within the Army environment [109]. Spouse satisfaction with the way of life has been shown to be a strong predictor of enlisted men's attitudes to remaining in the military [110] and marital problems have been shown to be a significant predictor of retention [111]. Whereas the majority of studies suggesting that military wives suffer adverse psychological consequences were conducted during the separation of a deployment or during war, a US study of the wives of Air Force personnel posted in the Far East [112] during peacetime found no difference between military and non-military wives.

Studies of marital relationships showed that each war of the 20th century was accompanied by an increase in the divorce rate, with veterans of Korea being particularly affected. The divorce risk was highest in men who entered the services later in life, even for marriages that commenced before the war began. The general (non-military) factors that lead to marital problems are obvious: disruption of the life cycle, frequent moves and long periods of separation [113]. Deployment per se does not appear to predict marital violence [114] and there is no evidence that combat directly leads to marital violence. There is however an indirect association, with combat being associated with PTSD and antisocial behaviour, both of which may have a direct negative effect on marital health [58, 115, 116]. Combat coupled with a pre-military background of antisocial behaviour and domestic violence is the strongest predictor of later problems [114]. Men who are traumatised by combat are more likely to be physically aggressive to their wives than men exposed to other sorts of trauma [117], though it is unclear whether this reflects a selection effect where men with a propensity to violence are drawn to the military.

Taft et al [118] examined interrelationships among combat exposure, symptoms of PTSD, and family adjustment in a sample of male and female Operation Desert Storm veterans (n=1,512). For both male and female veterans, higher combat exposure was associated with higher PTSD symptoms, which in turn were associated with poorer family adjustment,

although these indirect effects did not reach statistical significance. For female veterans, after adjusting for PTSD symptoms, combat exposure was negatively associated with family adjustment. When the relative impacts of separate PTSD symptom groupings were examined, those reflecting withdrawal/numbing and arousal/lack of control significantly and indirectly accounted for the negative effects of combat exposure on family adjustment.

Sayers et al [119] investigated whether psychiatric symptoms are associated with family reintegration problems in recently returned US military veterans. Participants were 199 military veterans who served in Iraq or Afghanistan after 2001 and were referred for behavioural health evaluation from primary care. 75% of the married/cohabiting veterans reported some type of family problem in the past week, such as feeling like a guest in their household (41%), reporting their children acting afraid or not being warm toward them (25%), or being unsure about their family role (37%). Among veterans with current or recently separated partners, 54% reported conflicts involving "shouting, pushing, or shoving," and 28% reported that this partner was "afraid of them." Depression and posttraumatic stress disorder symptoms were both associated with higher rates of family reintegration problems.

2.1.7.5 Employment and education

In terms of employment and occupational status post-Service, German veterans of World War II appeared to fare badly initially, but the negative effects of military service diminished rapidly as the German economy recovered (by 1955 those who served were indistinguishable from their non-military counterparts) [120]. Pre-Service educational level, although not initially important on men's immediate return, became more important as time progressed.

The literature on US veterans is consistent in finding a positive effect of military service on the status and achievement of World War II veterans and equally consistent in finding a negative effect on veterans of Vietnam. Work by Angrist & Krueger [121-123] suggests that selection effects are important in explaining these findings, particularly so for those concerning veterans of World War II. When selection effects were controlled for, World War II veterans were shown to earn no more than, or even slightly less than, comparable non-veterans. For Vietnam veterans, analyses in which selection effects were controlled for showed that white veterans earned approximately 15% less on average than comparable non-veterans, but that black veterans were less severely affected.

2.1.8 Pre-Service and in-Service factors

2.1.8.1 Pre-Service vulnerability

Iversen et al [124] investigated the influence of childhood adversity on health among male UK military personnel, using data from the KCMHR 2003 cohort for males in the regular UK Armed Forces (n=7,937). Each participant was asked to indicate whether each of a set of statements applied to him. Example statements include "Did not come from a close family" and "Used to get shouted at a lot at home". For each participant, a "vulnerability count" was derived, by counting the number of statements that the participant felt applied to him. Higher vulnerability counts were associated with being single, of lower rank, having low educational attainment and serving in the Army. Higher counts were also associated with a variety of

negative health outcomes. Two main factors emerged as important predictors of ill health: a “family relationships” factor reflecting the home environment and an “externalising behaviour” factor reflecting behavioural disturbance. These findings show that pre-enlistment vulnerability is an important individual risk factor for ill health in military men, awareness of which is important in understanding post-combat psychiatric disorder. However, it is important to note that these broad statistical associations are an imperfect guide to individual decision making on recruitment. First, the individual risk factors are in general not sufficiently strong. Second, these risk factors need to be considered in the context of the overall risks *and benefits* of military life to those with pre-existing social disadvantage.

2.1.8.2 *Prior assault*

Smith et al [125] investigated the relationship between prior assault and new-onset PTSD symptoms using data from the Millennium Cohort. Data on exposures and health outcomes were collected at baseline (2001 to 2003) and follow-up (2004 to 2006) from over 55,000 participants, with prior assault assessed at baseline by responses to questions about whether participants had ever suffered forced sexual relations, a sexual assault, or a violent assault. Of these, 5,324 were deployed in Iraq and Afghanistan, reported combat exposures, and were free of PTSD at baseline (881 women and 4,443 men). New-onset PTSD symptoms or diagnosis among deployers reporting combat exposures occurred in 22% of women who reported prior assault and 10% of women who did not report prior assault. Among men, the corresponding rates were 12% and 6%, respectively. Adjusted for baseline factors, the odds of new-onset PTSD symptoms were more than 2-fold higher in both women and men who reported assault prior to deployment.

2.1.8.3 *Gender*

On health outcomes for women veterans, perhaps the most striking finding is the general lack of literature. Women were left out of almost all studies of Vietnam as authors argued that they had not been exposed to conflict and from the National Academy of Sciences 1977 Survey of the Veterans Affairs system on the grounds that they only constituted 2% of the veteran population. One Vietnam study that did include women showed that some women went on to develop PTSD in a manner similar to their counterparts who were men [58]. Both in Vietnam [126] and in the Gulf [127], women veterans reported in theatre sexual harassment. A national cross-sectional telephone survey revealed that 48% of women veterans had experienced assaultive violence while in the military, including rape (30%) and physical assault (35%) [128, 129]. A postal survey of women veterans confirmed these findings [130].

2.1.8.4 *Reserve status*

The number of reservists is increasing so information on associations between reserve status and adverse outcomes is particularly pertinent. Using data from the KCMHR 2003 cohort, Hotopf et al [4] showed that increases in mental health problems are seen in UK reservists who have served in Iraq, in contrast to the situation with regulars, a finding confirmed by Iversen et al [26]. Browne et al [131] investigated possible explanations for this increase. All adverse health outcomes were more common in reservists than in regulars. Reservists were older and of higher rank than regulars. They reported higher exposure to traumatic experiences, lower unit cohesion, more problems adjusting to homecoming and

lower marital satisfaction. For most health outcomes, differences between regulars and reserves could be explained by differences in role, experience of traumatic events or unit cohesion in theatre. The exception was PTSD symptoms, which were most powerfully affected by problems at home rather than events in Iraq.

These studies show that the adverse impact of deployment to Iraq on mental health was greater for reserves than for regulars [4] and give some insight into the likely explanations for this difference [131]. Whilst there were differences in military exposures and in the ways in which regulars and reserves were managed in 2003, evidence from a small study [132] suggests that by 2006 these differences had reduced as a result of a specific MOD initiative "One Army". Data from the recent Iversen papers (see section 2.3) suggest, however, that this had not at that point had a direct impact on mental health.

2.1.8.5 Porton Down

Carpenter et al [133] studied cancer morbidity in British military veterans included in chemical warfare agent experiments at Porton Down. This was a historical cohort study of 17,013 members of the Armed Forces who took part in tests of chemical warfare agents from 1941 to 1989 (Porton Down veterans) and a similar group of 16,520 who did not (Non-Porton Down veterans), with follow-up continuing until December 2004. 3,457 cancers were reported in the Porton Down veterans, compared with 3,380 cancers in the non-Porton Down veterans. While Porton Down veterans had higher rates of ill defined malignant neoplasms, in situ neoplasms, and those of uncertain or unknown behaviour, overall cancer morbidity was the same in both groups.

Venables et al [134] studied mortality in British military participants in experimental research into chemical warfare agents at Porton Down. This was a historical cohort study of 18,276 members of the Armed Forces who took part in tests of chemical warfare agents from 1941 to 1989 (Porton Down veterans) and a similar group of 17,600 who did not (Non-Porton Down veterans), with follow-up continuing until December 2004. After a median follow-up of 43 years, 40% (7,306) of Porton Down and 39% (6,900) of non-Porton Down veterans had died. All cause mortality was slightly greater in Porton Down veterans, more so for deaths outside the UK. Of 12 cause specific groups examined, rate ratios in Porton Down veterans were increased for deaths attributed to infectious and parasitic, genitourinary, circulatory, and external (non-medical) causes and decreased for deaths attributed to in situ, benign, and unspecified neoplasms. There was no clear relation between type of chemical exposure and cause specific mortality. The mortality in both groups of veterans was lower than that in the general population. The authors noted that, while mortality was slightly higher in Porton Down than non-Porton Down veterans, without information on other important factors, such as smoking or service overseas, it was not possible to attribute the small excess mortality to chemical exposures at Porton Down.

2.1.8.6 Northern Ireland

Though the evidence base is limited, it is often suggested that serving in Northern Ireland is associated with particular mental health problems. The only study we were able to find involved questionnaire assessments of 200 servicemen before and after a tour of duty in Northern Ireland. Using the General Health Questionnaire as a measure of psychiatric 'caseness', Lawrenson & Ogden [135] found that pre-deployment distress was present in 25% of the sample. Psychological difficulties were increased by over 50% after return from

deployment, with Service personnel commenting particularly on how they had been affected by factors such as cramped conditions and sleep deprivation. The study achieved an excellent response rate. However, the Lawrenson & Ogden study did not, and could not by itself, identify the particular effect of security duties in Northern Ireland on the mental health of soldiers.

2.1.8.7 Exposure to combat

Ikin et al [136] investigated the association between war service, anxiety, PTSD and depression in Australia's 7,525 surviving male Korean War veterans and a community comparison group. A survey was conducted using a self-report postal questionnaire which included the PTSD Checklist, the Hospital Anxiety and Depression Scale and the Combat Exposure Scale. PTSD, anxiety and depression were more prevalent in veterans than in the comparison group. These disorders were strongly associated with heavy combat and low rank.

Klaassens et al [137] studied the mental health of Dutch peacekeeping veterans, 10-25 years after deployment, and its association with deployment-related traumatic events. Having randomly selected a group of 1,046 peacekeeping veterans who participated in military missions in Lebanon, the former Yugoslavia, and various other missions between 1979 and 1997, they sent a questionnaire assessing current levels of psychological distress (Brief Symptom Inventory, BSI) and a questionnaire assessing trauma related to deployment. Psychological data were available for 729 veterans. In 83% of the veterans, no significant psychological distress was found, whereas 17% scored above the BSI cut-off for psychopathology, in line with normative data for a non-patient group. No significant association was found between trauma exposure 10-25 years ago and current BSI scores, with trauma-exposure explaining just 9% of the variance in psychological distress. These findings show that, in this group of veterans, military peacekeeping operations do not seem to have caused severe psychological distress 10-25 years after deployment.

Sareen et al [138] investigated mental disorders, suicidal ideation, self-perceived need for treatment, and mental health service use attributable to exposure to peacekeeping and combat operations among Canadian military personnel. Data from the Canadian Community Health Survey Cycle 1.2 - Canadian Forces Supplement, a cross-sectional population-based survey of active Canadian military personnel (n=8,441), were used to estimate population attributable fractions of adverse mental health outcomes. Exposure to either combat or peacekeeping operations was associated with posttraumatic stress disorder, one or more of the mental disorders assessed in the survey, and a perceived need for information. A substantial proportion, but not the majority, of mental health-related outcomes were attributable to combat or peacekeeping deployment.

Sareen et al [139] examined the relationships between combat and peacekeeping operations and the prevalence of mental disorders, self-perceived need for mental health care, mental health service use, and suicidality. The study was a cross-sectional, population-based survey of currently active Canadian military personnel (n=8,441). The prevalence of any past-year mental disorder was 15% and the prevalence of a self-perceived need for care was 23%. Most individuals meeting the criteria for a mental disorder diagnosis did not use any mental health services. Deployment to combat operations and witnessing atrocities were associated with increased prevalence of mental disorders and perceived need for care. After

adjusting for the effects of exposure to combat and witnessing atrocities, deployment to peacekeeping operations was not associated with increased prevalence of mental disorders.

Smith et al [140] presented baseline data that were collected on 77,047 US service members in 2001 to 2003 as part of the Millennium Cohort Study. The authors calculated unadjusted, adjusted, and weighted means for the Medical Outcomes Study Short Form 36-item Survey for Veterans physical and mental component summary scores over a variety of demographic and military characteristics at baseline. Average physical and mental component summary scores were slightly more favourable in this military sample compared with those of the US general population of the same age and sex. Factors independently associated with more favourable health status included being male, being married, higher educational attainment, higher military rank, and Air Force service. Combat specialists had similar health status to other military occupations. Having been deployed to Southwest Asia, Bosnia, or Kosovo between 1998 and 2000 was not associated with diminished health status.

2.1.8.8 Resettlement

A major piece of qualitative work on the transition from military to civilian life was conducted by Jolly [141], who conducted in-depth interviews with a cross-section of the ex-Service community (n=62). Jolly reported that regardless of what range of practical resettlement advice was made available at the time of transition some people still left “without any clear view of the way ahead”. She viewed the transition to civilian life as a process that had to be worked at, suggesting that military personnel who are nearing the end of their service should be encouraged to develop a strong desire to fulfil an alternative ambition; that there should be some recognition that the period immediately after leaving will be difficult for some leavers; and that instead of rushing through this time, leavers should be encouraged to use it for reflection.

The National Audit Office (NAO) [142] examined the MoD’s provision of resettlement support, using information from a survey of recent Service leavers, from interviews with key personnel, from financial and administrative records, and from departmental papers. The target group for the survey was all personnel who left the Service in the 2 years up to October 2006 (n=46,871). Those whose address was unknown and those whose last address was in Northern Ireland were excluded, leaving 38,153 participants, of which just 4,997 responded, giving an overall (unadjusted) response rate of 13%. No analyses of response bias were undertaken, but the low response rate means the sample will almost certainly be unrepresentative of the population of Service leavers. As this survey was the key source of information on the experiences of Service leavers, all that can be said about the NAO report in the context of the current report is that it provides a useful overview of the resettlement support provided by the MoD.

2.1.9 Screening

French et al [143] studied barriers to screening for physical and psychological illness by surveying the opinions of UK Service personnel. 73 men and women from the three UK Services, of various ranks and age, underwent a semi-structured interview after completing a screening questionnaire. Participants were asked about the veracity of their answers and their views of the screening questionnaire. Questionnaires were then sent to 4,496 randomly

selected personnel from the three Services, to assess the validity of the main emerging themes. The main barriers to health screening were lack of trust, perceived low quality of healthcare, and perceived lack of concern within the institution about work environments and home life. The central issue was 'confidence' in military health care provision. Screening was considered worthwhile, but many confided that they would not honestly answer some items in the questionnaire. Lack of trust in medical confidentiality, stigmatisation, and fears that the process would jeopardise career prospects were stressed, with many Service personnel admitting to seeking medical help outside the Armed Forces. The concerns raised by these Service personnel may endanger the value of a screening programme and the provision of health services. Emphasis should be placed on gaining the confidence of those targeted for health screening.

In two separate papers, Rona et al [144, 145] assessed the acceptability and value of screening for physical and psychological illness in the UK Armed Forces. Both papers were based on a study in which 4,500 men and women from the three UK Services were randomly selected to receive either a full or an abridged screening questionnaire. The full questionnaire included the General Health Questionnaire-12 (GHQ-12) the PTSD checklist, 15 symptoms, a self-assessed health status question and questions on alcohol behaviour (WHO Audit). The abridged questionnaire included the GHQ-4, a slightly shortened PTSD checklist and 5 symptoms, but excluded questions on alcohol behaviour. All 'screen-positive' and a random 'screen-negative' sample were invited to attend a medical centre.

Rona et al. [144] reported that 67% of the participants completed the abridged questionnaire, slightly (5%) but significantly more than completed the full questionnaire. Of those receiving a full or abridged questionnaire, 32% and 23% respectively were 'screen-positives', most of the difference being attributable to alcohol behaviour. However, fewer than 30% of the servicemen invited to attend a medical centre accepted the invitation, even fewer during the preparation for deployment to Iraq (exactly when such a screening programme might be used). Furthermore, those with problems were more reluctant than controls to attend. The authors concluded that screening for psychological illness has little support among Service personnel, perhaps because they are unkeen to share concerns with a military doctor, and that screening has less support during pre-deployment periods than at other times.

Rona et al [145] estimated the positive and negative predictive values, sensitivity and specificity of the full and abridged versions of the screening questionnaire, using the assessments of primary care doctors (medical officers [MOs]) of whether participants needed medical help as a gold standard. MOs were aware that the screening was aimed at detecting psychological illness, but were blind as to the 'screen-positivity' of any participant. The MO completed a questionnaire that asked whether the patient needed medical help and whether the MO was previously aware of this need. 314 participants were available for analysis. The positive predictive value was 47% (95% confidence interval [CI]: 36–59%) for the full questionnaire and 48% (95% CI: 36–60%) for the abridged questionnaire. Of those 'screen-positive' participants who the MO rated as needing help, one third had problems already known to the MO, regardless of the length of the questionnaire. The sensitivity and specificity of the full and abridged questionnaires were 43% and 74%, and 36% and 83% respectively. The positive predictive value did not vary greatly between health dimensions and nor did the selection of personnel with very high scores. Having noted that the use of MOs as a gold standard is important and appropriate given their central role in initiating the management of any condition uncovered by a screening programme, the authors concluded

that the validity of the screening questionnaires for physical and psychological health in the military was mediocre.

Rona et al [146] reviewed the international literature on the value of screening for psychological illness in military personnel, emphasising the need for caution given the observed lack of acceptability of the intervention, barriers to confidentiality, uncertain or low validity of the available instruments, and lack of evidence on the effectiveness of such programmes, as well as the possibility of causing harm rather than providing benefit. They noted that, while there is insufficient information on the opportunity cost of a screening programme, such a programme could possibly result in scarce resources being diverted away from more effective health care activities. The priority, they propose, is to focus on improving support structures for ex-serving and serving personnel, both within and outside the military organization, and improving recognition and management of health problems in an atmosphere of confidentiality and modesty about the ability to screen for psychological problems.

More recently, Nevin [34] assessed the validity of the mandatory Pre-Deployment Health Assessment (PreDHA) screening questionnaire to identify deployed personnel who have had a recent mental health disorder diagnosis. This was a retrospective cohort study of 15,195 US service members deployed in support of combat and reconstruction operations in Afghanistan. The Defense Medical Surveillance System (DMSS), the Department of Defense's longitudinal medical surveillance database, was queried to identify cases among the cohort with a recent diagnosis of a pertinent mental health disorder and to obtain those participants' responses to the PreDHA. Overall, 11,179 participants had a PreDHA available within the DMSS at the time of analysis and 615 had at least one mental health disorder diagnosis during the pre-deployment period. Of these 615, 465 had a PreDHA available and of these 224 (48%) answered yes to the PreDHA question: "During the past year, have you sought counselling or care for your mental health?" This indicates that the majority of service personnel will not admit to having received mental health care, and thus that mental health screening is not a satisfactory way of identifying those with an increased risk of post deployment mental health problems.

Hoge et al [147] conducted a population-based descriptive study of all Army soldiers and Marines who completed a routine post-deployment health assessment between 01 May 2003 and 30 April 2004, on return from deployment to Afghanistan (n=16,318), Iraq (n=222,620) or other locations (n=64,967). Health care use and occupational outcomes were measured for 1 year after deployment or until leaving the service if this occurred sooner. The prevalence of reporting a mental health problem was 19% among service members after returning from Iraq compared with 11% after returning from Afghanistan and 9% after returning from other locations. Mental health problems reported on the post-deployment assessment were significantly associated with combat experiences, mental health care referral and use, and attrition from military service. 35% of Iraq War veterans accessed mental health services in the year after returning home; 12% per year were diagnosed with a mental health problem. More than 50% of those referred for a mental health reason were documented to receive follow-up care, although less than 10% of all service members who received mental health treatment were referred through the screening programme.

The findings of Nevin [34] and Hoge et al [147] that screening has low validity for identifying service members with diagnosed mental health disorders or those who subsequently seek treatment are consistent with those of the UK studies described above. Two key issues with

mental health screening are a reluctance to admit to problems and a reluctance to seek treatment. Mental health screening is unlikely to be successful unless and until both of these issues have been addressed.

2.1.10 Characteristics of ex-Service personnel

2.1.10.1 The UK ex-Service population

In a series of reports [148-151], the Royal British Legion presented the findings of a survey of 1,211 adults in the UK ex-Service community, conducted in April 2005. Methodological information on this study is provided in the first of these reports [148]. The survey was part of the RSGB omnibus survey. A nationally representative sample (n=6,218) of the UK population aged 16 or older was interviewed, with the module on ex-Service personnel as the first module. The sample was then weighted by gender, age, social class and region to ensure it was representative of the UK population. Of the 6,218 individuals, 689 were ex-Service personnel and a further 522 were dependants of ex-Service personnel, giving a total sample size for the ex-Service community of 1,211. The corresponding weighted figures were 6,180 for the total sample and 612 for ex-Service personnel. Applying these weighted figures to the 2005 estimate of the UK population gives an estimated total number of ex-Service personnel of 4.8 million.

Two key limitations in the design of the study mean that this figure of 4.8 million is likely to be an underestimate of the true size of the ex-Service population. First, the national omnibus survey is a sample of adults living in residential dwellings: it excludes adults living in prisons, in residential or nursing homes, in hospital, in rehabilitation centres, in temporary accommodation such as hostels, on Army bases, and those who are homeless. Second, the national omnibus survey is an in-home survey that relies on people answering the door and agreeing to be interviewed. Those who are physically unable to open the door, or to be interviewed, or who chose not to, are therefore excluded.

Approximately 60% of the sample had left the Service 40 or more years previously [148], suggesting that the majority had served in World War II or had completed National Service. Hence, while the sample may be representative of the current ex-Service population as a whole, it is not representative of the population who have left the Service in recent years, having served in the Gulf, in Iraq or in Afghanistan. Comparisons of the population of ex-Service personnel with the general population [148, 149] showed the former to be older, with the primary difference being the proportion aged 65 or older. When this difference was taken into account, apparent differences between the two populations generally disappeared. A notable exception is self-reported poor health, which for those aged less than 65 was more common in ex-Service personnel than in the general population.

A major focus of the Royal British Legion study was the welfare needs of the ex-Service community. The questions used have not been used in other major surveys: they were developed specifically for the study and asked only of ex-Service personnel or their dependants. It is therefore difficult to compare the welfare needs of the ex-Service population with those of the general population.

Analyses reported by the Royal British Legion [150] suggest that between 2005 and 2020 the ex-Service population will get smaller and younger. The population projections presented,

which are based on simple assumptions about outflow from the Armed Forces and death rates among the ex-Service community, suggest there will be very little change in the number of ex-Service personnel aged 54 or younger between 2005 and 2020. These projections also show that the number aged 55 to 84 will decrease substantially over the same period. There is an anomaly for the 85+ age group, which the projections show will increase in number over the forecast period. The generation who were obliged to serve in the military, either in World War II or through post-War National Service, would have been aged 63-84 in 2005 and now represent a “bulge” in the number of ex-Service personnel. Health improvements over recent and coming years should mean that an ever-growing proportion of this generation will survive into their late eighties. Hence this “bulge” in the size of the ex-Service community can be expected to continue moving into the oldest age-band.

2.1.10.2 UK Service leavers

Iversen et al [152, 153] have published two papers on Service leavers, based on baseline and follow-up data from the King’s Military Cohort of personnel who served in the Armed Forces in 1991. The Iversen et al [152] study involved two elements: a cross-sectional comparison of ex-serving and still-serving personnel using baseline data and a prospective longitudinal study using baseline data to predict outcomes at follow-up. Baseline data were collected in 1997, on 5,164 still-serving and 2,908 ex-serving personnel. Follow-up data were collected in 2001, on 1,029 still-serving personnel, 926 ex-serving personnel, and a further 392 personnel who were in Service at baseline but had since left the Service.

Analysis of the baseline data showed that officers and non-commissioned officers (NCOs) were less likely to have left than junior soldiers; that men were less likely to have left than women; that those who served in the Navy or RAF were less likely to have left than Army participants, and that those with PTSD were more likely to have left than those without. Men were less likely to have left early (within 4 years), as were those with lower levels of education.

Poor mental health at baseline predicted leaving by follow-up, whereas NCO status or officer status was predictive of retention compared with being a private soldier.

Analysis of the baseline leavers for whom employment data were available (n=2,792) revealed that 12% of the leavers were unemployed. Being male, being married and NCO status were associated with employment at follow-up. Being deployed to the Gulf was associated with employment (once the effects of poor mental health were accounted for), while those with poor mental health at baseline were less likely to be employed at follow-up. For those who had already left at baseline, there was no consistent change in measures of mental health status between baseline and follow-up.

Two key findings emerge from the above results. The first is that, in terms of employment, most people do well when they leave the Armed Forces. However, in the context of Gulf veterans this conclusion perhaps needs some amplification: service in the Gulf was indeed associated with future employment, but only after adjustment was made for the negative effect of poor psychological health. The second is that psychological health is an indicator of whether a person is likely to stay in the military and, if they leave, whether they will be in full time employment as a civilian. Also of note is the finding that mental health remained fairly static after leaving the Armed Forces: those who were well remained well; those who were symptomatic remained symptomatic.

Iversen et al [153] assessed the mental health needs and treatment experiences of a representative sample of UK ex-Service personnel, selected from the previously studied 1991 cohort as those most at risk of long-term psychological or social problems. Participants were those with self reported mental health problems assessed by questionnaire at baseline and at follow-up, having left the military by follow-up, and those who were unemployed at follow-up, having left the military by baseline. 496 individuals were identified, of which 315 (64%) responded and agreed to participate. The advantages of using the existing cohort were that participants were originally randomly selected, and therefore were not seeking treatment or compensation, and that vulnerable individuals could be selected from the cohort on the basis of their previous questionnaire responses.

The first key finding from this study was that the most important diagnoses in ex-Service personnel were classic psychiatric disorders rather than specific service-related psychiatric problems. The most common disorders were depressive episodes and anxiety syndromes; almost all of those with PTSD had a comorbid diagnosis.

The second was that relatively few of those who had a diagnosis were seeking help, and few of those who had consulted were receiving specialist help. Only 50% of those who reported problems while in service admitted to seeking help, and this proportion only increased slightly when individuals encountered problems in post-Service life. The most common reason for veterans not seeking help was a sense of resilience and stoicism. Those who reported problems in service also reported the embarrassment and stigma of admitting a need for help. However, for those who reported seeking help while still in service, access to a psychiatrist was more likely, perhaps because access to medical services is easier for serving personnel.

Most who sought help used primary care, and only a minority had contact with specialist services. The majority of those who were unwell were receiving treatment from their general practitioner in the form of antidepressant medication. Only a minority saw a psychiatrist or other mental health professional, and the advice and support that the ex-Service charities provide was rarely accessed. Despite good evidence of benefit for psychological treatments for depression and PTSD, only a minority of participants who sought help were receiving these interventions, and only 4% had been offered the best evidence based treatment: cognitive behavioural therapy.

van Staden et al [154] studied another population thought to be at high risk of poor outcomes: those leaving the Services early via the United Kingdom Military Corrective Training Centre. Participants were interviewed 1 week before leaving (pre-discharge) and followed up 6 months later. 111 participants completed pre-discharge interviews, of which 74 (67%) were successfully followed up and interviewed 6 months later. 38 (56%) of those followed up were classed as being disadvantaged at follow-up, based on data on debt, temporary accommodation, mental health problems, and unemployment. Being disadvantaged at follow-up was associated with having pre-discharge mental health problems, with receiving an administrative discharge, and with having a short sentence. Factors associated with poor outcomes on leaving were often interrelated. Nevertheless, this study provides a useful indication, at least in this atypical sample, of how one might identify, at the point of discharge, those most at risk of further disadvantage.

Green et al [155, 156] studied the personal experiences of, and the organisational responses to, emotional and mental health issues in young ex-Service personnel. This was a small-

scale piece of qualitative work that has only been published on a university website. The study involved in-depth interviews with 3 welfare staff representatives, 6 family members (3 mothers, 1 father, 1 aunt, 1 partner) and 23 ex-Service personnel (all but 1 of whom were ex-Army), from which the main themes to emerge were 1) that striking the right balance between the needs of welfare and those of warfare is extraordinarily difficult and in some circumstances impossible and 2) that on leaving the service respondents felt ill-equipped to deal with civilian life.

Iversen & Greenberg [157] published a brief review on the mental health of regular and reserve military veterans. They reviewed studies from the UK and elsewhere, both those that relate specifically to ex-Service personnel and those that relate to veterans of a particular campaign. For the UK, the key sources were the above Iversen et al. studies of Service leavers [152, 153] for information on ex-Service personnel and studies by Hotopf et al [4] and Browne et al [131], both of which were discussed earlier in this chapter, for information on the mental health of reservists. The authors noted that the most common mental health disorders in the UK Armed Forces post-deployment are depression, alcohol misuse and anxiety disorders, and that these are also the most common disorders in both the US military and the UK general population. Other summary points were that the majority of service personnel do well after leaving military life, that a minority who leave with psychiatric problems appear to be at risk of social exclusion and ongoing ill health, and that reserve veterans are at greater risk as they do not have access to the usual support networks of the regular military. The importance of improving the knowledge and expertise of primary care services about veterans' mental health issues and increasing the availability of treatment options was stressed.

Murphy et al [158] reviewed the available literature on the mental health of ex-Service personnel. In terms of information sources and conclusions, this review is similar to the Iversen and Greenberg review discussed above.

2.1.10.3 Australian Vietnam veterans

O'Toole et al [159] presented findings from a longitudinal cohort study of a random sample of Australian Vietnam veterans, designed to assess veterans' post-war physical and mental health 36 years after the war (2005-2006) and to examine its relation to Army service, combat, and post-traumatic stress disorder (PTSD) assessed 14 years previously (1990-1993). For various long-term conditions, prevalence in veterans (n=450) was compared with prevalence in the Australian general population. Among veterans, general health and some health risk factors were poorer, and medical consultation rates were higher, than expected for the Australian general population. Of 67 long-term conditions, prevalence was higher for 47 and lower for 4 in veterans than in the general Australian population. Half of all veterans took some form of medication for mental well-being. The prevalence of psychiatric diagnoses exceeded Australian population expectations. Military and war service characteristics and age were the best predictors of physical health, while PTSD was most strongly associated with psychiatric diagnoses. Draftees had better physical health than regular enlistees but no better mental health.

3 SUMMARY OF EVIDENCE

3.1 Overview

Overall, the available information on health and social outcomes and health service experiences among ex-Service personnel shows that:

- Taken as a whole, the ex-Service population, which has been estimated at around 3.8 million for England, has comparable health to the general population.
- The current generation of UK military personnel (serving and ex-serving) have higher rates of heavy drinking than the general population. However, this difference may attenuate with age.
- The most common mental health problems for ex-Service personnel are alcohol problems, depression and anxiety disorders.
- In terms of the prevalence of mental disorders, ex-Service personnel are similar to their still-serving counterparts and broadly similar to the general population.
- Military personnel with mental health problems are more likely to leave over a given period than those without and are at increased risk for adverse outcomes in post service life.
- The minority who leave the military with psychiatric problems are at increased risk of social exclusion and ongoing ill health.
- The overall rate of suicide is no higher in UK ex-Service personnel than it is in the UK general population; ex-Service men aged 24 or younger are, however, at an increased risk relative to their counterparts in the general population.
- Early Service leavers are more likely to have adverse outcomes (e.g. suicide, mental health problems) and risk taking behaviours (e.g. heavy alcohol consumption, suicidal thoughts) than their longer serving counterparts.
- Studies of delayed onset PTSD have tended to be retrospective and based on relatively small numbers of ex-Service personnel. The results of these studies should be treated with caution until prospective data are available.
- Involvement in chemical weapons experiments at Porton Down is not associated with an overall increase in mortality or cancer morbidity.
- Deployment to the Gulf in 1990/91:
 - is associated with increased mortality from non-disease related causes (e.g. road traffic accidents) in the short term but this effect subsides over time and is no longer detectable 7 years post deployment;
 - is not associated with adverse effects on reproductive health or with an overall increase in the incidence of cancer.

- Deployment to Iraq and Afghanistan is associated with adverse mental health outcomes among some groups, particularly those with pre-Service vulnerabilities, those who experience a high level of combat, and reservists (compared with regulars).
- US data, collected from US military personnel post-deployment to Iraq or Afghanistan, suggest a surge in mental health problems on return to the US that continues to increase over time. There is as yet no evidence to suggest that this is happening in the UK.

3.2 Mental health

3.2.1 Depression and anxiety

Many studies have shown that depression and anxiety are among the most common mental disorders [26, 153, 157, 158]. This has been shown for still-serving and ex-serving personnel, and these disorders are also common in the general population.

Recent studies of Canadian serving personnel have shown that depression severity is a strong predictor of health service use [76] and that those who have PTSD with comorbid depression are more likely to have sought treatment than those without [77].

3.2.2 PTSD

Findings from recent studies show that:

- The prevalence of PTSD appears to be higher for US than for UK personnel. However, these differences are partly explained by methodological differences between studies [35] and may also reflect the longer deployments of US personnel.
- PTSD is associated with a range of adverse outcomes and comorbid conditions, including relationship problems [118, 119]; arthritis, musculoskeletal problems and gastrointestinal problems [21, 22]; and lower ratings of general health, more missed workdays, and more physical symptoms [31].
- Mental and physical health scores are diminished in those with current PTSD symptoms but increase towards normal levels with resolution of PTSD symptoms [32].
- Specific combat exposures, rather than deployment per se, are among the strongest predictors of PTSD.
- Having experienced a prior assault is associated with an additional effect, over and above that of combat exposure, on the risk of developing PTSD [125].
- Low mental or physical health status before combat exposure significantly increases the risk of symptoms or diagnosis of PTSD after deployment [33].

- There is little convincing evidence for delayed-onset PTSD as opposed to delayed help seeking among those with pre-existing PTSD and this topic has not been systematically studied using prospective rather than retrospective data [32, 56].
- In US personnel who have returned from Iraq, the likelihood of reporting PTSD symptoms appears to increase over the first 12 months after returning [57].

3.2.3 Alcohol problems

The main findings on alcohol are that:

- Among still-serving personnel, the prevalence of heavy drinking is higher than in the general population [81].
- Deployment experiences and problems at home during and following deployment, as well as the occupational milieu of the unit, influence the risk of heavy drinking following deployment to Iraq [83].
- Relative to their still serving counterparts, ex-Service personnel are no more likely, and may be slightly less likely, to be heavy drinkers [81, 82].

3.2.4 Substance abuse

We are not aware of any systematic studies of drug use among UK Service personnel. Data collection on the King's Military and KCMHR cohorts did not include questions on drug use.

3.2.5 Self-harm

Very little is known about self-harm among military personnel. A recent comparison of UK Service personnel who presented to hospital for self-harm with controls from the general UK population suggests that self-harm by Armed Forces personnel may often be a response to interpersonal and employment problems complicated by alcohol misuse, with relatively low suicide intent. The prevalence of self-harm among military personnel is, however, unknown.

3.2.6 Suicide

The main findings from recent studies of suicide among current or former members of the Armed Forces are that:

- Among UK ex-Service personnel, the overall rate of suicide is no greater than in the general population. However, the risk of suicide in men aged 24 and under who have left the Armed Forces is approximately two to three times higher than the risk for the same age group in the general and serving populations [6].
- Among serving members of the UK Armed Forces there are fewer suicides than expected compared with the UK general population. This is the case for each of the

three Services (Naval Service, Army and Royal Air Force) and for each age group except Army males under 20 years of age where there are more deaths than expected [7].

- Among male and female US ex-Service personnel, suicide deaths are more likely to involve firearms than those in the general population [8].
- Among Canadian active military personnel, sexual and other interpersonal traumas (for example, rape, sexual assault, spousal abuse, child abuse) are significantly associated with suicide attempts in both men and women, even after adjusting for sociodemographic factors and mental disorders, and the number of traumatic events experienced is positively associated with increased risk of suicide attempts [10].

The finding that young ex-Service personnel are at increased risk is of particular interest. Many of these will be early Service leavers. Hence this finding supports the general conclusion that early service years are at increased risk for a range of adverse outcomes.

3.2.7 Relationship breakdown

The available data on marital relationships and relationship breakdown come from the US, and are limited. A recent study found weak associations among combat exposure, symptoms of PTSD, and family adjustment in a sample of male and female Operation Desert Storm veterans [118]. Another study found that depression and posttraumatic stress disorder symptoms are both associated with higher rates of family reintegration problems [119]. Neither study specifically considered ex-Service personnel. Moreover, US studies are difficult to interpret as deployment length (which is typically greater for the US than for the UK military) is likely to have a marked effect on marital relationships. The follow-up of the KCMHR 2003 cohort, for which results will start to become available in 2010, includes questions on relationships and relationship breakdown.

3.2.8 Violent behaviour (including domestic or sexual abuse)

At present, nearly all the data on the relationship between sexual violence and military service come from the US. The follow-up of the KCMHR 2003 cohort includes questions on violent behaviour more generally but does not include specific questions on sexual violence.

3.2.9 Offending

Despite the media interest in this area, there are no robust statistics on the overall risk of offending or the factors that affect this risk among ex-Service personnel. Studies that are currently underway, by DASA and by KCMHR, are needed to shed some light on this contentious issue.

3.3 Physical health

3.3.1 Mortality

Data on mortality among ex-Service personnel are limited to those on suicide (see above) and those on specific cohorts, namely Gulf War veterans and veterans of chemical warfare experiments at Porton Down:

- For UK veterans of the 1991 Gulf War, overall mortality was no higher, 13 years after the end of the war, than for a matched group of non-deployed controls. The excess in non-disease-related deaths previously reported was confined to the initial 7 years of follow-up [15].
- In UK veterans of chemical warfare experiments at Porton Down, and in a control group of veterans who were not involved in these experiments, mortality was lower than in the general population [134].

3.3.2 Injury (including deafness and limb loss)

We are not aware of any systematic studies on the prevalence of particular injuries among ex-Service personnel.

3.3.3 Arthritis and musculoskeletal problems

A recent US study [19] found that arthritis was both more prevalent and more severe in ex-Service personnel than in the general population.

Arthritis was also shown to be associated with PTSD in a study of Australian Vietnam veterans [22], as were musculoskeletal problems, both in Australian Vietnam veterans [22] and in Canadian veterans of peacekeeping operations [9].

3.3.4 Cancer

A recent study [18] found no current excess risk of cancer overall, or of site specific cancers, in UK veterans of the 1991 Gulf War. It should be noted however that the long latent period for cancer means effects cannot yet be ruled out.

Relative to a comparison group of veterans who were not involved in these experiments, UK veterans who took part in chemical warfare agent experiments at Porton Down had higher rates of ill defined malignant neoplasms, in situ neoplasms, and those of uncertain or unknown behaviour, but a similar level of overall cancer morbidity [133].

3.3.5 Sexual and reproductive health

A recent review of reproductive outcomes in military veterans [16] concluded that:

- For male veterans there is no strong or consistent evidence for an effect of service in the first Gulf War on the risk of major, clearly defined, birth defects or stillbirth in offspring conceived after deployment. Effects on specific rare defects cannot be excluded, however, as none of the studies had the statistical power to examine them.
- For female veterans, there is insufficient information to make robust conclusions, although the weight of evidence to date does not indicate any major problem associated specifically with deployment to the Gulf.
- No study to date has been able to examine risk according to particular exposures. Hence possible associations with specific exposures for smaller groups of exposed veterans cannot be excluded.

3.3.6 Cardiovascular health

We are not aware of any data on the cardiovascular health of ex-Service personnel. A recent US study that assessed the relationship of PTSD with several physical conditions found significant relationships for other conditions but no significant relationship for cardiovascular disease [21]. In the literature on military personnel, cardiovascular health does not generally feature as an important outcome measure. Excessive alcohol consumption, which is relatively common in military personnel, is however a risk factor for cardiovascular disease.

3.3.7 Respiratory health

We are not aware of any systematic studies of the respiratory health of ex-Service personnel. The only relevant study we are aware of is a study of Australian Vietnam veterans that assessed the relationship of PTSD with a range of physical conditions and found an association for asthma [22]. In the literature on military personnel, respiratory health does not generally feature as an important outcome measure.

3.4 Health service experiences

3.4.1 Health service requirements

There is no clear evidence that ex-Service personnel have special requirements for health services, although it is certainly possible that they may.

3.4.2 Barriers to care

Relative to their still-serving counterparts, ex-Service personnel report an additional problem of not knowing where to go for help [157, 158]. However, stigma and barriers to care with regards to mental health problems and mental health care exist within the general population. There is, as yet, no evidence to suggest that stigma and barriers to care are greater in ex-Service personnel than in their counterparts within the general population.

3.5 Other factors

Many factors are known to affect the risk of adverse outcomes. For many such outcomes, the important risk factors include:

- Being younger
- Being single
- Being in the Army
- Holding a lower rank
- Being male
- Being exposed to combat
- Being a Reserve
- Pre-enlistment factors such as childhood adversity
- Being deployed for a long time
- Having mental health problems at the time of discharge
- Being an early Service leaver

This is a complex issue, as characteristics that are risk factors for some outcomes may be protective for others. The issue is further complicated by the interactions that occur among the various factors. Studies that have attempted to identify those who are most at risk of adverse outcomes have generally involved the use of composite variables. The utility of this approach in a practical rather than a research context has not been established.

4 RECOMMENDATIONS FOR FUTURE RESEARCH

4.1 Introduction

Since 2003, a considerable amount of research has been published (see Chapter 2). In this chapter, we return to some of the areas that were highlighted in the 2003 report [1] as requiring further research, outlining the relevant information that has become available since the publication of that report, and commenting on the gaps in the evidence that still exist and the type of studies that would be required to fill them. Where we describe studies that would be required to fill the gaps in the evidence, we indicate for each *whether the study is underway, whether it has been planned but has not yet started, or whether (to the best of our knowledge) no such study has been planned.*

4.2 Long-term outcomes

We still know relatively little about the long term outcomes of ex-Service personnel. While large, prospective longitudinal studies that follow-up participants into post-Service life are the priority for the future, arguably the best data we have at present are those that come from the Adult Psychiatric Morbidity Survey. These data are important as they are taken from a nationally representative survey. However, for the modern generation, as opposed to the World War II and Cold War generations, the sample size is too small for reliable conclusions to be drawn. *We are aware that DASA are in communication with ONS about including in the 2011 Census a question on whether the respondent has ever served (rather than whether they are currently serving).* Inclusion of this question on the Census would allow a range of important questions to be addressed.

Specific examples of the general question on long-term outcomes include:

- a) Are there regional variations in outcomes across the UK?
 - b) Are there specific risk factors for persistent, as opposed to transient, unemployment?
 - c) How many veterans are in prison?
 - d) Is it possible to establish an appropriate general population comparison group to estimate the risks and benefits of military life, taking into account the non-random nature of military recruitment?
- a) On regional variation, we know no more now than we did in 2003. However, this question could now be addressed using follow-up data from the 2003 KCMHR cohort study, which includes postcode data for Service leavers. (This is the postcode of the address they live at post-Service, so it is not possible to investigate whether Service leavers return to the area they come from.) *The postcode data have been collected but as yet there are no plans for any analyses of them.*

- b) We still know very little about risk factors for persistent unemployment. However, researchers at KCMHR are addressing this question for UK ex-Service personnel using data from a clinical interview study. Relevant data have also been collected as part of the follow-up of the KCMHR 2003 cohort. For the clinical interview data, *the analysis is underway, and a paper will be prepared for publication by the end of 2009*. For the data from the cohort study, *data analysis will begin later this year, with the first results being seen early in 2010*.
- c) Despite recent publicity, the issue of the number of ex-Service personnel in prison remains unresolved. The NAPO reports are not sufficiently robust to give reliable conclusions. However, two projects that are *currently underway* will provide more clarity. First, DASA are aiming to assess the risk of incarceration in ex-Service personnel relative to that in an age-matched sample of the general population of England and Wales. Second, researchers at KCMHR are aiming to investigate the risk factors for offending and incarceration in ex-Service personnel. This latter study will include data on pre-Service vulnerability, deployment history, mental health and alcohol abuse, and will be unique in its ability to quantify the relative contributions of pre-Service vulnerability, service history and mental health to subsequent offending.
- d) The identification of an appropriate general population comparison group, although interesting, is potentially problematic due to the socio-demographic make-up of the UK Armed Forces. However, it might be useful to identify specific occupational groups who could be studied and whose health and social outcomes could be compared with those of ex-Service personnel. Occupations of possible interest are fire-fighters and the police. *We are aware of no plans to take this forward at the present time*. However, we have learnt via Connecting for Health and the Information Centre that it may now be possible to identify military service via the NHS Central Register, using dates of exit from and re-entry to the NHS. If successful, this will offer new opportunities for long term record linkage and retrospective cohort studies. *A pilot study is currently underway in Scotland*.

4.3 Pre-Service, in-Service and post-Service factors

Recent work on the role of childhood adversity [124] is relevant. However, this focussed on still-serving personnel and involved collecting information from participants at a time when they had already entered the military. It is therefore possible that the participants' recollections of their childhood experiences were coloured by their subsequent military experience. What is needed to elucidate the role of pre-Service factors on outcomes for ex-Service personnel is either a longitudinal cohort study commencing with data collection on entering the military or the deliberate collection of data at recruitment with the explicit purpose of record linkage to data on subsequent service and post-Service outcomes. *We are not aware of any plans to take this forward at the present time*.

A specific question that was highlighted in the 2003 review is whether those who join the military after spending time in Local Authority care are particularly suited, or unsuited, to military life. This encompasses the question of whether these individuals would have done worse had they not joined the Armed Forces and suggests a life course approach, similar to that used in the UK Birth Cohort studies, in which outcomes are also considered for those with similar risk profiles (i.e. time in care) who never joined the Armed Forces. *Data on time*

in care have been collected as part of the KCMHR cohort study but as yet there are no plans for any analyses of them.

There are many studies on in-Service factors, some of which have focused on the role of these factors as determinants of outcomes among ex-serving personnel. Most studies have not as yet considered ex-Service personnel from the most recent conflicts in Iraq or Afghanistan. Studies that follow-up existing military cohorts into post-Service life will be important in filling this evidence gap. *Data have been collected in the KCMHR cohort study, and data analysis will begin later this year, with the first set of results being seen in early 2010.*

There have been some recent studies on help-seeking and barriers to care in which UK ex-Service personnel have been specifically considered. The results of these studies suggest that important barriers to care exist for military personnel and that veterans appear to take their barriers to care with them when they return to civilian life, while also reporting additional difficulties of not knowing where to seek help. However, the studies did not include comparison groups from the general population. Looking at what is already known on the subject, the problems look similar, but without specific studies using identical methodology and both military and non-military subjects it remains difficult to determine whether barriers and stigma are a greater problem for the ex-Service population than for the general population. Nevertheless, there would appear to be a requirement for further research on experiences of and attitudes to health care, particularly mental health care, among ex-Service personnel. *We understand that plans are being developed to include questions on this topic in the General Household Survey.*

4.4 Screening

There are two aspects to this issue. The first concerns the value of screening for vulnerabilities to a particular outcome before the outcome occurs – i.e., on recruitment, pre-deployment, post-deployment or on discharge. To date evidence suggests that such screening has only limited application in the prediction of those who fail to complete training, and virtually no benefit in predicting those who will develop mental health problems post-deployment. The value of specific screening for vulnerabilities (for example at discharge) to subsequent post-discharge adverse outcomes has not yet been assessed and *we are not aware of any plans to address this issue.*

The second concerns the value of screening for actual disorder, as has been initiated for mental health disorders in the US's Post Deployment Health Screening programme. There is insufficient evidence at this stage on which to reach a conclusion about the value of such a screening programme. A randomised controlled trial (as is required by the UK National Screening Committee before the implementation of any such policy in the NHS) should be a priority for any future research programme. *This area is currently being considered by KCMHR and ACDMH with the hope of acquiring funding from the US for a trial of post-deployment screening.*

4.5 Alcohol

Two sets of questions were identified in the 2003 review:

- To what extent is alcohol use a feature of military life, and what positive role does it play in creating social bonding?
- What is the particular role of alcohol abuse for the vulnerable leaver? What role does it play in subsequent social exclusion?

We now know considerably more than we did in 2003 on the prevalence of heavy drinking in the UK Armed Forces and the factors that predict it. However, there have been no studies of the role of alcohol. There is a need for qualitative work on the role of alcohol and alcohol policy, using comparisons and contrasts with policy on drugs. *There are no plans to take this forward at the present time.*

We know little about the role of alcohol in the life of Service-leavers, whether they are vulnerable leavers or not. In relation to vulnerable leavers, Van Staden [154] found no relationship between the average level of alcohol consumption prior to discharge and the level of disadvantage 6 months after leaving. However, the study was small and alcohol consumption after leaving was not reported. Data from the follow-up of the KCMHR 2003 cohort could be used to assess associations between alcohol use and adverse outcomes in ex-Service personnel. It also seems reasonable to suggest that any qualitative work on the role of alcohol in the military should encompass its role in both still-serving and ex-serving personnel, as well as in the transition process itself. *Data have been collected in the KCMHR cohort study, and data analysis will begin later this year, with the first results being seen early in 2010.*

4.6 Special populations

Two special populations were highlighted in the 2003 review: those who have served in Northern Ireland and those who have been through the Military Corrective Training Centre (MCTC) at Colchester.

On Northern Ireland, all we are aware of, in addition to the study by Lawrenson & Ogden [135], is a study of the Royal Irish Regiment for which *data have already been collected, though they have not yet been analysed.*

A recent study by van Staden et al [154] provides information on those who have been through the MCTC. However, this was a small study, which needs to be supplemented with further studies, either on those who are discharged from the MCTC specifically or on vulnerable leavers more generally. *There are no plans to take this forward at the present time.*

4.7 Interventions

The following questions were identified in the 2003 review:

- What are the effects of recent interventions on the number, experiences and outcomes of homeless ex-Service personnel?
- Could mentoring be used to improve social outcomes for vulnerable Service leavers?
- When is the most appropriate time for resettlement activities?

A study of ex-Service personnel among the homeless population of London that was published by the Royal British Legion provides some information. However, we are not aware of any systematic evaluation of the impact of interventions in this area, *or of any plans to conduct such an evaluation.*

An evaluation of a “light touch” mentoring service for leavers exiting from the Infantry Training Centre at Catterick found no difference 6 months after termination between those who had been mentored and a control group (for measures related to accommodation, jobs, alcohol and relationships). This was a small study and allocation to the mentoring programme was not random.

We are not aware of any studies on resettlement. However, the follow-up of the KCMHR 2003 cohort includes questions on resettlement, and asks participants for consent to access their resettlement records. It should therefore be possible to address this question in the near future. Results from this cohort study could, in turn, be used to influence the design of a randomised control trial. Results from a qualitative in depth interview study *currently being undertaken* by Cambridge University could also be used to inform such a study.

The pilot Community Mental Health schemes for ex-Service personnel are underway and are *due to be evaluated by Sheffield University in 2010.* The results of this evaluation will assist in the identification and setting up of care pathways and care models for ex-Service personnel.

Other schemes that have been established since the publication of the 2003 report include the Reservists’ Mental Health Programme (RMHP), which caters for the referral, assessment and treatment of eligible reservists, and the re-establishment of the Medical Assessment Programme (MAP). An evaluation of the RMHP *is currently underway, with preliminary results expected by the end of 2009.*

4.8 Summary of recommendations

While the evidence base has grown considerably since 2003, many gaps remain concerning the health and social outcomes of UK ex-Service personnel. Many of the remaining questions require studies that involve longitudinal follow-up. We therefore suggest that:

- Consideration should be given to a stratified follow up of a sample of veterans. This would be made simpler if consent was obtained at recruitment, during military service or at discharge to permit later follow up. Steps should be taken to assess the feasibility of obtaining routine consent for follow-up and health surveillance on leaving the Armed Forces. *We are not aware of any specific work in this area*, though there are positive developments in the area of informed consent and data protection.
- Studies should be planned in which data collection starts before either in-Service or post-Service adverse outcomes have occurred. This could involve either a longitudinal cohort study commencing with data collection on entering the military or the deliberate collection of data at recruitment with the explicit purpose of record linkage to data on subsequent service and post service outcomes. *We are not aware of any plans to conduct studies of this type.*

There is potential for using data linkage of routinely collected data, especially with the introduction of the Defence Medical Information Capability Programme and Connecting for Health. Potential obstacles include issues of informed consent and data protection as well as more practical issues related to the need for a systematic approach to be taken to collecting and collating data. However, there are some positive developments. First, the development of the Secondary Uses Service to include Safe Havens where researchers do not need to use personally identifiable data has considerable potential. Second, researchers at King's College London have obtained permission to record link data on the KCMHR military cohort with criminal justice system data from the Police National Computer. After consultations with the Ministry of Justice, the Home Office and the Information Commissioner, and with appropriate ethical committees, it was agreed that this was a lawful example of record linkage of identifiable person information without consent. Third, the new GMC Guidelines on Confidentiality (September 2009) signal a more proportionate approach to using health care data to promote health care research. Finally, there is the new Scottish pilot study that aims to identify ex-Service personnel using the NHS Central Registry.

While longitudinal cohort studies can and are being used, randomised controlled trials (RCTs) remain the gold standard where the question is "What works for whom?". For example, UK policy on screening is formulated by the National Screening Committee, and requires evidence from RCTs before any new screening programme can be adopted by the NHS. Successive Surgeon Generals have indicated that the military health care system should use the same standards. Any policy decision on the efficacy of a particular intervention can only be determined by an RCT.

There is a need for further qualitative work to explore questions which are currently not well enough understood to be studied using quantitative methods. Qualitative studies could, for example, be used to examine the transition from military to civilian life, or to explore the risks and benefits of alcohol use within current military culture.

Finally, we recommend that the evidence on health-related outcomes and experiences among ex-Service personnel is reviewed periodically.

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